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THE SMALL MAMMAL COMMUNITY OF THE HERCYNIAN MOUNTAIN BEECH AND FIR FOREST (ŠUMAVA Mts.)

Miloš ANDĚRA

Department of Zoology, National Museum (Natural History), Václavské náměstí 68, CS-115 79 Praha 1, Czechoslovakia

A b s t r a c t. For six years, the community of 10 species of small terrestrial mammals was investigated in the fragment of a natural climax beech and fir forest in the Šumava Mts. Using the line snap-trap method, a total of 1 011 specimens were caught (8 391 trap-nights). The highest dominance was found in *C.glareolus* (55.0 %), *A. flavicollis* (23.7 %) and *S. araneus* (15.2 %); these species were euconstant. The diversity (H') of the community under study varied between 0.864 and 1.766, its equitability between 0.503 and 0.971; the respective total mean values were 1.743 and 0.525. As regards the relative abundance, the total mean catch per 100 trap-nights was 12..05 individuals, the number of specimens trapped rose from spring to autumn. The fluctuation in the relative abundance in a succesive years are documented as well. For the most abundant species, data were provided on the litter size, sex ratio and weight structure of population. The analysis of the results showed that fragment of the natural virgin forest called "Medvědice" belongs indoubtedly to the best preserved remains of the Hercynian climax mixed forest in the territory of Central Europe.

The different types of a beech forest represented the original climax communities in the most of the territory of Central Europe. However, up to the present time forests with the natural composition of a trec and herb strata persist only fragmentary with the special preference of a larger mountain regions. Complex investigations of the last fragments of such biocenoses that were relatively little affected by the activities of the man, bring valuable knowledge on the composition of our original fauna and flora. In spite of the great importance of these island habitats, only little attention has been paid until the present time to the mammal fauna of the natural mountain forest ecosystems of the Central Europe region. Most of the authors prefered the faunistic point of the view, and thus only several papers give more concrete data on the basic coenological characteristics (e.g. Zejda & Klíma, 1958; Gaisler, 1983; Bürger, Anděra & Zbytovský, 1987).

Because of a relatively high number of well-preserved fragments of different types of forest habitats, the region of the Šumava Mts. appears to be a very suitable model area for investigations on the structure and diversity of "natural" animal communities, and of their functional significance in the present culture landscape as well. Moreover, the results obtained can be used as a basic data source as regards the protectional management of the area under study.

Hence, the present paper is aimed at describing the structure of the small mammal community of the Hercynian mountain mixed forest, and providing data for further comparisons with another woodland ecosystems.

STUDY AREA

The investigations were carried out in the mountain forest on the territory of the State Nature Reserve "Medvědice" near the settlement Dobrá lying about 3 km to the south from the town of Volary (District of Prachatice, southern Bohemia; 48° 41'N. latitude and 13°56'E. longitude) at the elevation of 850 - 950 m a.s.l. The study area forms a small island of mixed forest with the area about 16 ha in the extensive spruce monocultures (Pl. I, II).*

The local climate is characterized by a short growing season amounting in average 120 days per year, and by a low annual air temperature as well (about 5° C). With the average annual precipitations of 793 mm, the region belongs among the moistest in Czechoslovakia. In general, the locality under study falls in the climatic region C_1 (Syrová, 1957).

The relief of the experimental plot has the character of a steep mountain slope with sparse boulder spaces. Despite missing water sources, the soil is moist almost throughout the year.

In phytocoenological respect, the original forest stand of this region belongs to the sixth vegetation tier, i.e. spruce-beech-fir tier (Raušer & Zlatník, 1968). Despite forest management as early as in the first decades of the 20th century, the tree stratum has a virgin character with a relatively natural woody composition. The forest type groups represented in the reserve under study comprise *Ulmeto-Aceretum* (6.6. percent), *Ulmeto-Aceretum, Impatiens noli-tangere-Typ* (23.0 percent), *Fageto-Aceretum superior, Stellaria nemorum (Impatiens noli-tangere)* - Typ (36.6 precent), *Abieto-Fagetum, Asperula odorata (Millium effusum)* - Typ (5.0 percent), *Abieto-Fagetum acerosum, Petasites albus (Impatiens noli-tangere)* - Typ (23.6 percent) and *Fageto-Abietum superior, Petasites albus* - Typ (5.2 percent). More detailed phytocoenological characteristics can be obtained in the paper of Hladilin (1976) and Průša (1985). Generally speaking, the virgin forest is of superannuated thin high forest nature with small diameter differentiation.

The debris and most of the other parts of the area under study are covered during the peak of vegetation by a rich herb stratum in which *Urtica dioica, Petasites albus, Senecio fuchsi, Oxalis acetosa, Impatiens noli-tangere, Sanicula europaea, Chaerophyllum hirsutum, Mercurialis perennis, Ajuga reptans, Galeopsis pubescens, Lamium galeobdolon, Ranunculus lanuginosus, Actaea spicata, Galium odoratum, Asperula odorata, Stellaria nemorum, Myosotis sylvatica, Pulmonaria officinalis, Geranium robertianum* and *Calamagrostis villosa, Milium affusum* and *Festuca altissima* are the most abundant species. Only on the debris under the pure spruce group the herb layer grew evidently worse - cover is smaller, *Dryopteris spinulosa* and poor mosses on stones prevail.

MATERIAL AND METHODS

The field work was accomplished during the years 1982 - 1987. Small mammals were captured both in small snap traps of commercial type, and in special museum snap traps of a medium size. The traps were laid in lines of 50 to 150 ones, spaced 3 - 4 m. These lines covered different parts of the area under study. The traps were set usually for two nights, and baited alternatively with pieces of bacon and carrot. A total of fourteen trapping periods in various months of the growing season were carried out. In the course of six years of the investigation the total number of trap-nights was 8 391, and, on the whole, 1 011 animals of 10 species of small mammals were caught (Tab. 1).

After catching, all individuals were processed using normal mammalogical methods. Most of the specimens obtained are deposited in the collections of the Department of Zoology, National Museum, Praha.

RESULTS

Characteristics of the community

Species composition: A total of 10 species of a small terrestrial mammals was caught in the experimental plot of the mountain beech and fir forest under study: *Talpa europaea, Sorex araneus, Sorex minutus, Sorex alpinus, Clethrionomys glareolus, Microtus agrestis, Pitymys subterraneus, Apodemus flavicollis, Apodemus sylvaticus and Muscardinus avellanarius.*

* Plates I and II will be found at the end of this issue.

Besides, some larger mammals were occasionaly observed (*Sciurus vulgaris, Martes martes, Capreolus capreolus, Cervus elaphus, Sus scrofa*), and the occurrence of *Meles meles, Lynx lynx and Mustela* sp. is also highly probable. Thus, the present spectrum of the State Nature Reserve "Medvědice" supplemented in this way comprises 15 (18?) species of mammals except of bats.

Table 1. A reviews of the total catch of small terrestrial mammals in the virgin forest "Medvědice"

	Spring		Summer		Autumn		Total	
	n	D(%)	n	D(%)	n	D(%)	n	D(%)
S. araneus	20	12.6	44	17.1	90	15.2	154	15.2
S. minutus	-	-	-	34	5.7	34	3.4	
S. alpinus	-	-	-	-	9	1.5	9	0.9
T. europaea	-	-	2	0.8	-	-	2	0.2
C. glareolus	100	62.9	130	50.3	326	54.8	556	55.0
P. subterraneus	3	1.9	-	1.2	5	0.8	11	1.1
M. agrestis	-	-	-	-	1	0.2	1	0.1
A. flavicollis	35	22.0	78	30.2	127	21.4	240	23.7
A. sylvaticus	1	0.6	-	-	1	0.2	2	0.2
M. avellanarius	-	-	1	0.4	1	0.2	2	0.2
Total	159	100.0	258	100.0	594	100.0	1011	100.0
Diversity H'	1.431		1.536		1.800		1.743	
Equitability E'	0.616		0.621		0.517		0.525	
Relative abundance (ind./100 trap-nights)	4.96		12.22		19.32		12.05	

However, the present paper is based on the detailed evaluation of the sample captured in the traps only. As can be seen from Tab. 1, the number of species ascertained in the catch shows a tendency to increase in dependence on the season: from 5 species caught in the spring to 9 ones found in the autumn.

D i v e r s i t y a n d e q u i t a b i l i t y: The index of a species diversity H' (by Shannon and Weaver, in $\log_2$) in the total material was 1.743 (Tab. 1), for a single trapping periods it achieved the limiting values of 0.864 and 1.766. Comparing the value of this index for various seasons of the year, it was lower in spring (H' = 1.431) than in autumn (H' = 1.800). This fact was associated with the higher number of species present in the autumn samples as well as with higher catches due to increased population density. Comparing the successive years of the study, the highest species diversity was found in 1984 (H' = 1.790), followed by those in 1983 (H' = 1.693), 1985 (H' = 1.657), 1986 (H' = 1.441) and 1982 (H' = 1.260).

The total equitability computed for 6 years of the study was 0.525, the values of this index for a single trapping periods varied between 0.503 - 0.971. Seasonal fluctuations of the equitability had a rather different character as compared with those of the species diversity. In the spring and summer months, the values are very similar (0.616 and 0.621, respect.), in autumn the equitability of the community is slightly decreasing (0.517). As

regards the variation of the equitability in different years of the study, the values fluctuated from 0.449 in 1982 to 0.714 in 1984.

D o m i n a n c e:. In the total catch of 1 011 small mammals, *C. glareolus* showed the highest dominance (55.0 %), followed by *A. flavicollis* (23.7 %) and *S. araneus* (15.2 %) (Tab. 1). These three species together represent nearly 95 percent of the whole material of the present study. From remaining species, only *S. minutus* shows a slightly higher value of dominance (3.4 %), whereas dominance of the remaining species varied between 1.1 and 0.1 percent. From the total number of 10 species we can determine 3 as the dominant ones and the remaining 7 as the accessory ones.

As regards the seasonal fluctuations of the dominance, these are not much expressed in our material. The summarized dominance of three dominant species varied in succesive seasons of a year in a relatively small range (91.4 - 97.7 %), and also their dominance order is the same in spring, summer and autumn (Tab. 1).

In contrast to slight seasonal fluctuations, the variability of the species dominance in succesive years of the study is much more evident (Tab. 2), especially in *A. flavicollis*

Table 2. The species dominance of the small mammal community under study

	1982	1983	1984	1985	1986	1982-1986
S. araneus	3.6 %	19.5 %	10.2 %	28.4 %	13.1 %	15.2 %
S. minutus 1.2	1.7	15.7	3.2	-	3.4	
S. alpinus	0.8	1.7	-	0.6	0.7	0.9
T. europaea	-	0.7	-	-	-	0.2
C. glareolus	47.4	60.9	54.3	50.0	62.8	55 0
P. subterraneus	0.8	2.4	0.8	-	0.7	1.1
M. agrestis	-	-	0.8	-	-	0 1
A flavicollis	-	0.7	-	-	-	0.2
A. sylvaticus	45.8	12.4	18.2	17.8	22.0	23.7
M. avellanarius	0.4	-	-	-	0.7	0.2
Total	100.0	100 0	100.0	100.0	100 0	100.0

and *S. araneus*. The high dominance of *A. flavicollis* was the characteristic feature of the community in 1982 (45.8 %), while the lowest level was found in 1983 (12.5 %). The dominance of *S. araneus* varied between 3.6 to 28.4 % (the maximum occurring in 1985, the minimum in 1982). The dominance of *C. glareolus* was less variable in this respect during our study (47.4 to 62.8 %).

C o n s t a n c y: *S. araneus* and *C. glareolus* were present in all of the 14 samples taken of small mammal community under study; hence they can be denoted as euconstant species together with *A. flavicollis* ascertained in 13 samples (92.9 %). *P. subterraneus* was less frequent (C=50.0 %) and can be described as either constant, or accessory. *S. minutus and S. alpinus* fell to the range of accessory species, and the remaining ones - *T. europaea* (7.1 %), *A. sylvaticus* (14.3 %), *M. avellanarius* (14.3 %) and *M. agrestis* (7.1%) - must be considered as accidentary.

R e l a t i v e a b u n d a n c e: For the purpose of comparison, relative numbers were expressed as the numbers of specimens caught per 100 trap-nights.

The total catch per 100 trap-nights was 12.05 individuals. However, there is an apparent general tendency for the catch increase from spring to autumn in dependence on the growth of the population density of the eudominant species in particular. Thus, the relative abundance was 4.96 individuals in spring, 12.21 in summer, and 19.32 in autumn.

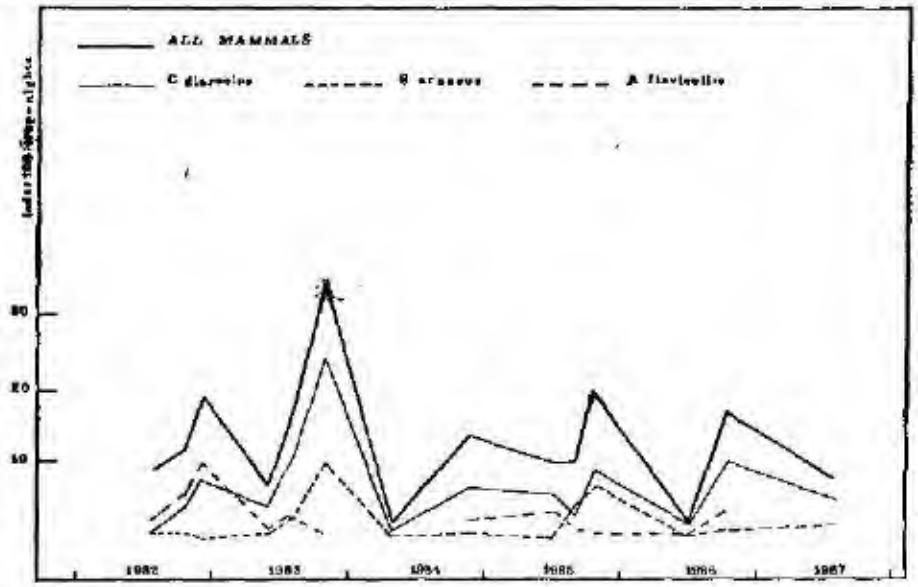

Fig. 1. The variation of the relative abundance of three most abundant species of the small mammal community (in individuals /100 trap-nights)

As regards the year fluctuations, the total mean value of the relative abundance was the highest in 1983 amounting to 16.73 individuals. On the contrary, the relative abundance in 1984 and 1986 were almost twice lower (7.17 and 8.53 individuals) (Tab. 3).

The variations of the relative numbers per 100 trap-nights of the three eudominant species are illustrated separately by the plotting curves in Fig. 1. It is evident that the density fluctuation of *C.glareolus* is the main determining factor for the variation of the relative abundance of the whole small mammal community under study. The population of *C. glareolus* showed a conspicuous peak of density in 1983 (10.20 inds.), and the high synchronization of the curves of fluctuation in numbers between *C. glareolus* and the whole community for the period of the study is obvious. Unlike *C.glareolus*, the course of fluctuation of *A. flavicollus* was rather different; the size of the catch was the lowest in 1983, being the highest in 1982. As to *S. araneus*, the curve showing the variations of relative abundance differs from that showing the variation in the numbers of rodents. The catches were much lower without marked fluctuations except two autumn peaks in 1983 and 1985.

Table 3. The relative abundance of the small mammal community under study (in individuals/100 trap-nights)

	1982	1983	1984	1985	1986	1982-1986
S. araneus	0.53	3.27	0.87	3.80	0.94	1.84
S. minutus	0.18	0.28	1.34	0.40	0.05	0.41
S. alpinus 0.12	0.28	-	0.07	-	0.11	
T. europaea	-	0.11	-	-	-	0.02
C. glareolus	7.02	10.20	4.63	6.68	4.50	6.63
P. subterraneus	0.12	0.39	0.07	-	0.05	0.13
M. agrestis	-	-	0.07	-	-	0.01
A. flavicollis	-	0.11	-	-	-	0.02
A. sylvaticus	6.77	2.09	1.55	2.39	1.58	2.86
M. avellanarius	0.06	-	-	-	0.05	0.02
Total	14.80	16.73	8.53	13.36	7.17	12.05
Trap-nights	1709	1775	1489	1422	1911	8391

Bionomical notes

Our material enabled us to analyzed only some population dynamic factors, and only for *C. glareolus, A. flavicollis and S. araneus* at that.

L i t t e r s i z e: With respect to the small number of pregnant females in *S. araneus* (n = 1. 8 embryos, May), the litter size was analyzed in *C. glareolus* and *A. flavicollis*.- Sixty-two pregnant females of *C. glareolus* showed the mean number of 4.44 embryos (range: 3 - 7). The litters tended to be markedly smaller in autumn as compared to those of remaining seasons of the breeding period: spring $\bar{x}$ = 5.10 (n = 20), summer $\bar{x}$ = 5.22 (n = 9), autumn $\bar{x}$ = 3.70 (n = 33).

The average litter size of *A. flavicollis* was 6.11 embryos per female (n = 18), and sets of 6 - 7 embryos occurred most frequently (total range: 3 - 8). The mean litter size was the highest in spring, 6.27 (n = 11, range 5 - 7), in summer the mean decreased to 6.00 (n = 5; range 3 -8), and in autumn even to 5.50 (n = 2; range 4 -7).

As in the other species, two pregnant females of *P. subterraneus* with the sets of two embryos have been found in July and November, respectively.

W e i g h t s t r u c t u r e o f p o p u l a t i o n: To analyse the weight structure of population we used the material of three most abundant species (Tab. 4).

In spring, the population of *C. glareolus* consisted largely of the overwintered individuals (about 66 percent) weighing mostly 24 30 g ($\bar{x}$ = 27.5 g, range 20.5 - 33.0 g). Owing to frequent pregnancy in the female part of the population, the overwintered females were markedly heavier than the males in this period. The body weight of young-of-the-year was markedly lower amounting to the total range of 9.5 - 20.0 g and the total mean value of 13.9 g. The total spring mean body weight for both overwinterers and young-of-the year was 23.0 g (males $\bar{x}$ = 22.3 g, range 9.5 - 32.0 g; females $\bar{x}$ = 23.5 g, range 9.0 - 36.0 g).

In summer catches of *C. glareolus*, overwinterers represented about 26 percent. The mean body weight of females was again rather higher than that of males both in overwinterers and young-of-the-year. The total summer mean body weight of overwintered fraction was 28.2 g, the one made up by the young specimens showed the mean body weight substantially lower - 19.5 g. The total mean summer body weight of *C. glareolus* was 22.0 g (males x = 21.5 g, range 9.5 - 30.0 g; females x = 20.2 g, range 9.0 - 29.0 g).

Finally, in the autumn catches the population consisted of the large portion of non-overwintered individuals (89.4 percent) weighing mostly 20 - 24 g ($\bar{x}$ = 22.4 g, range 9.5 - 26.0 g), and the young males were slightly heavier than the females. The average autumn body weight of the overwinterers was 27.2 g (range 25.5 - 30.0 g), the total average body weight in the autumn catches of *C. glareolus* was 22.0 g.

The mean body weights of *A. flavicollis* were variable in a similar way (Tab. 4). In the catches of spring, summer and autumn, the respective mean body weights of overwinterers were 34.4 g, 35.6 g and 35.9 g. In the same period, the young-of-the year samples showed the total mean body weights of 16.6 g, 20.0 g and 23.5, respectively. The total mean body weight of *A. flavicollis* in spring was 26.9 g, in summer it reached to 27.7 g, and in autumn this value fell to 25.3 g.

As for *S. araneus* , the mean body weights of overwinterers and young-of-the-year differ significantly during the whole vegetation period (Tab. 4). Thus, there are no objective reasons for computing the total mean body weights for old and young animals. The mean body weight of overwinterers was higher in summer ($\bar{x}$ = 12.5 g) than in spring ($\bar{x}$ = 10.5 g), the means of non-overwintered specimens in spring, summer and autumn were 6.6 g, 7.8 g and 7.2 g, respectively.

S e x r a t i o: The sex ratio (percentage of males in the catch), determined from the total catch of the three most abundant species was the following: *C. glareolus* 52.2 %, *A. flavicollis* 44.4 % and *S. araneus* 56.0 % As regards seasons, the catch of *C. glareolus* contained a smaller percentage of males in spring (43.8 %), in summer the sex ratio was nearly balanced (48.6 %), and in autumn the males predominated (57.5 %). In the catch of *A. flavicollis*, males were fewer than females for the whole vegetation period (spring 30.6 %, summer 47.9 %, autumn 46.4 %). As for the catch of *S. araneus*, the males predominated markedly from spring to autumn (55.0 5, 62.5 % and 56.0%, respectively). Evaluating the sex ratio from pooled material of different age, the sex ratio in the catch of overwinterers of *C. glareolus* was balanced (49.6 %), while in the non-overwintered individuals the males predominated slightly (53.5 %). On the contrary, in both the samples of *A. flavicollis*, a significant preponderance of females was ascertained (39 2 % and 46.8 % of males, respectively). In *S. araneus*, we found 63.6 % males in the total catch of overwinterers, in the case of young-of-the-years the males predominated by 59.3 %.

Table 4. The variation in the body weight of three most abundant species of the small mammal community under study (in g)

Species		Spring	Summer	Autumn
overwintered individuals				
C. glareolus	♂♂	26.8, n=29 (24.0-32.0)	27.4, n=14 (25.5-30.0)	26.9, n=19 (25.5-29.5)
	♀♀	28.2, n=34 (24.0-36.0)	28.9, n=17 (24.5-40.0)	27.2, n=13 (25.5-30.0)
A. flavicollis	♂♂	29.7, n=3 (26.0-36.0)	34.0, n=17 (25.5-46.0)	35.9, n=9 (33.0-40.0)
	♀♀	35.3, n=18 (24.0-53.0)	37.1, n=18 (25.5-50.0)	35.9, n=9 (32.0-40.0)
S. araneus	♂♂	10.6, n=9 (8.5-11.5)	12.1, n=4 (11.5-13.5)	10.0, n=1
	♀♀	10.3, n=7 (8.0-15.0)	14.0, n=1	
young-of-the-year				
C. glareolus	♂♂	14.2, n=16 (9.5-18.0)	19.0, n=41 (9.0-23.0)	22.4, n=133 (9.5-26.0)
	♀♀	13.7, n=16 (9.0-20.0)	20.2, n=42 (9.0-29.0)	20.3, n=138 (11.0-29.0)
A. flavicollis	♂♂	15.5, n=8 (11.0-21.0)	21.2, n=17 (13.5-25.0)	24.1, n=49 (11.5-32.0)
	♀♀	17.9, n=7 (12.0-28.0)	18.9, n=19 (13.0-29.5)	23.0, n=58 (9.0-35.0)
S. araneus	♂♂	7.3, n=2 (7.0-7.5)	7.6, n=11 (7.0-9.0)	7.4, n=43 (6.3-9.5)
	♀♀	6.0, n=2 (5.5-6.5)	8.1, n=8 (7.0-9.0)	7.0, n=37 (5.5-8.5)

DISCUSSION AND CONCLUSIONS

As the results show, ten species of small terrestrial mammals were found in the study plot of mixed forest of relatively natural tree composition in the Šumava Mts. A characteristic feature of a small mammal community under study is mainly the clear dominance of three species - *C. glareolus*, *A. flavicollis* and *S. araneus* - making up 93.9 percent of all individuals caught. The species of sporadic occurrence (0.1 - 0.2 %) are of two groups. The first one is represented by the species scarcely trapped by common snap trap techniques, e.g. *T. europaea* and *M. avellanarius*, and thus the percentage values give no objective information on the actual dominance of these species in the community under study. On the other hand, other species occur in the virgin mountain forest occasionally, indeed. For example, *A. sylvaticus* penetrates into the area studied only exceptionally from the clearings in the surrounding spruce monocultures (nearest about 300 - 400 m). The same can be said of *M. agrestis* penetrating into closed woodland from the moister habitats in forest clearing or along forest roads.

Apart from the species mentioned, the occurrence of *S. alpinus* is of great importance, too. In the area studied, this shrew inhabits mainly boulder spaces with a distinctly moister and cooler microclimate. Thus we can suppose that former distribution of *S. alpinus* was probably much more continuous, preferring not only articulated banks of the mountain brooks and rivers, as it is commonly assumed now.

Finally, it is interesting to stress the absence of *Sicista betulina* in our material, although the species is known to occur on the clearings in the close vicinity of the reserve (J. Hanzák and A. Kůrka, personal communications).

Comparing the small mammal community studied with that of "Boubín" virgin, also natural mixed forest fragment in the Šumava Mts. region, the number of species was found to be lower in the latter (6 ones) (Z e j d a & K l í m a, 1958). However, this is certainly caused by substantially limited material (n = 92), as the rare species (in the woodland habitat) are practically missing (*P. subterraneus, M. agrestis, T. europaea*). On the contrary, a very similar species spectrum has been found in the small virgin "Ptačí stěna" in the zone of Blanský les Mts. (B ü r g e r et al., 1987), in which only the presence of *M. arvalis* (probably due to opener character of the forest stands) is of importance. Further, the species composition of the small mammal community inhabiting a dwarf mountain *Fageto-Aceretum* forest in the Orlické hory Mts. (the State Nature Reserve "Bukačka") is very similar to that found in our study plot. Apart from the absence of irregularly trapped *T. europaea*, the only difference on the species level was also recorded in the rare occurrence of *M. arvalis*.

As regards the species diversity, the values of H' in the communities compared varied mostly in the relatively small range from 1.70 to 1.76. Only in the mountain beech forest "Bukačka" in the Orlické hory ridge the diversity of the catch of small terrestrial mammals is about 1.5 times higher (H' = 2.558) (G a i s l e r, 1983). However, the difference could be probably explained by means of different trapping methods (combination of both snap-traps and pitfall traps) leading to a higher proportion of the shrews in the catch. For comparison, the index of diversity of small mammal community in the lowland broadleaved deciduous forest in southern Moravia was 1.88 (Z e j d a, 1986), while in the spruce monoculture it reached only 1.33 (Z e j d a, 1981).

C. glareolus, which is predominant in our material (55.0 %), was found to be eudominant also in the catches from the other natural woodland habitats in the Šumava Mts., as it was published by above mentioned authors (Boubín 52.2 %, Ptačí stěna 66.4 %). In the same localities, *S. araneus* attained the respective dominances of 29.4 % and 9.6 %. Comparing the dominances of two *Apodemus*-species, there appears to be a basic difference in the relation of *A. flavicollis* and *A. sylvaticus*. While in the catch from "Medvědice" virgin, the dominance ratio is 1 : 0.008 in favour of the former species,in the communities from "Boubín" and "Ptačí stěna" virgins the proportion of *A. sylvaticus* rose markedly (1 : 0.40 and 1 : 0.51, respectively). The significantly higher

dominance of a typical euryecieous species *A. sylvaticus* in the environment of the relatively natural climax virgin forest can demonstrate a more "artificial" character of these fragments, as follows from the comparison with the results from the "Medvědice" virgin. The explanation of this feature can be probably found either in the smaller extent of these virgin fragments and in a relatively open character of the whole foothill landscape (Ptačí stěna), or in a disturbed coherence of the forest stands by both artificial and natural corridors (roads, paths, brooks, etc.) (Boubín).

Furthermore, it is possible to present some comparisons of a relative abundance data. During snap-trapping in the "Boubín" virgin, K l í m a & Z e j d a (1958) found surprisingly low value of a year average relative abundance of the whole community amounting 5.72 ind.; that of the most numerous species, *C. glareolus*, was 2.99 ind. Thus both values are many times lower than those stated in the present paper. On the contrary, in different lowland forest types, the relative abundance was markedly higher reaching up the average values of 20.5 ind (Z e j d a, 1973) 1976). As the abundance of small mammals in coniferous monocultures is at least 5 times lower (Z e j d a, 1981; G a i s l e r, 1983 etc.), we can conclude that the population density of small mammals in mountain climax mixed forest attained approximately a middle level between the most productive lowland forest ecosystems on the one hand, and coniferous monoculutures of a suboptimal environmental conditions on the other.

Summing up the data obtained so far, from the mammalogical point of view we can consider the "Medvědice" virgin to be one of the most (if not the best) well-preserved fragments of the natural climax virgin stand in the Šumava Mts. region. This findings fits very well with those reported for both the plant and tree associations in geobotanical and phytocoenological studies (e.g. P r ů š a, 1976; P i š t a, 1972; H l a d i l i n, 1976). Therefore, an adequate protection of this locality is highly desirable for the future.

SUMMARY

In the course of six years, a small mammal community was studied in a climax virgin forest in the Šumava Mts. The study plot was situated on the territory of the reserve "Medvědice" at the elevation of 850 - 950 m s.l. The total catch consisted of 1 011 specimens of small mammals (the total of 8 391 trap-nights) of 10 species: *S. araneus, S. minutus, S. alpinus, T. europaea, C. glareolus, P. subterraneus, M. agrestis, A. flavicollis, A. sylvaticus and M. avellanarius.* The index of species diversity (H'), computed separately for single catches, varied between 0.864 and 1.766; the mean value was 1.744, being lower for the spring catches (1.431) than for the autumn ones (1.800). The equitability varied between 0.503 and 0.971. The most frequent species were *C. glareolus, A. flavicollis* and *S. araneus* making up altogether 93.9 percent of the whole material. Seasonal fluctuations of the dominance are not much expressed in our material while the variability of it in succesive years is evident (especially *in A. flavicollis* and *S. araneus*). In the frequency of occurrence, *S. araneus, C. glareolus* and *A. flavicollis*

were euconstant (92.9-100.0 %), *P. subterraneus* constant or accessory (50.0 %), *S. minutus* and *S. alpinus* fell to the range of accessory species, and the remaining ones are considered as accidentary. The total mean catch per 100 trap-nights was 12.05 individuals. A general tendency for the catch increase from spring to autumn is shown by the relative abundance being 4.96 inds. in spring, 12.21 in summer and 19.31 in autumn. In the community under study, fluctuation of the values of the species dominance in successive years was also observed. The average litter size, detetrmined by the number of embryos, was 4.44 (range 3 - 7) in *C. glareolus* and 6.11 (range 3 - 8) in *A. flavicollis*. To analyse the weight structure of population, the material of three most abundant species was used *(C. glareolus, A. flavicollis, S. araneus)*. The sex ratio in the total catch was balanced for *C. glareolus* (52.2 % of males), and males predominated markedly in the case of *S. araneus* (56.0 %). On the contrary, in *A. flavicollis* the females were predominant (only 44.4 % of males). Comparison with other similar fragments of natural forest shows that the "Medvědice" virgin appears to be one of the best-preserved remains of the natural climax forest of the Hercynian region in our territory, and, therefore an adequate protection management of this locality is highly recommendable.

Acknowledgement

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BOOK REVIEW

K o l e b i n o v a M. G.: *Acariformes, Trombidioidea, Trombiculidae, Leewenhoekiidae. Fauna Bulgarica 21*. Sofia: Publ. House Bulg. Acad. Sci. 1992, 172 pp, 82 figs. (In Bulgarian), Price Leva 13.00.

Another part of the series Fauna Bulgarica, a monograph dealing with chigger mites, parasitic larvae of mites of the families Trombiculidae and Leewenhoekiidae, was published at the beginning of this year. Its author, M. Kolebinova, summarized here the results of her 25 years' research on these parasites. Besides the book by N.I. Kudryashova ("Present State of Research of Chigger Mites - Acariformes, Trombiculidae - Fauna of the USSR", Moscow, 1979: 112 pp), this is the first European regional monograph concerning this very interesting and important group of parasitic mites. Moreover, the studied part of this continent is very interesting from the zoogeographical point of view.

The introduction (5 pages) and general part (24 pages) are written very briefly and contain particularly the explanation of all morphological details necessary for the work with the special parts of the book and for understanding other contemporary publications devoted to the taxonomy of these two families on an international scale. A total of 57 species found in the territory of Bulgaria are described in the book under review. The description of each species includes a table of standard measurments (minimal, maximal and mean values) and a table of drawings showing important morphological details. The keys comprise another 8 species living in south-eastern Europe and 2 subspecies (one of them is reported as new for the science). Both the descriptions and drawings are very good and a reader well-informed about chigger mites will distinctly recognize the positive effect of the many-years' cooperation of M. Kolebinova and P. H. Vercammen-Grandjean, one of the prominent experts dealing with this mite group in the last decades. (This effect is especially evident in the perfect drawings showing in the signs of Vercammen-Grandjean's handwriting).

Although the level of the book is very high, there are some omissions, confusions and mistakes. For instance, the mode of citations at the beginning of individual descriptions. If the name of taxon is immediately followed by the author's name, it means that the author described it. If the author used a known name, it should be separated from the author's name by a colon. This formal (but substantial) condition is considered only from page 44, but after page 51 the citations are again not uniform. On p. 36, of the two authors of the subgenus *Willmannium*, Vercammen-Grandjean et Langston, only Vercammen-Grandjean is cited in further text.

It is quite incorrect a new subspecies in the key without giving its description and illustration (see the key on p. 105: *Neotrombicula (Arctrombicula) rhinolophi* subsp. *cretaensus* Kolebinova (in lit.)). Unjustified is the change of the specific name *Chiroptella (O.) musca;* the name muscae was used not only by the author of the description (O u d e m a n s, 1906), but also by all following authors.

The most questionable is M. Kolebinova's view on the existence of *Netrombicula (Hirsutiella) zachvatkini* and *N. (H.) wilmanni*, which she considers to be two valid names, though *N. wilmanni* is a synonym of *N. zachvatkini*. This seems to be influenced by the view of Vercammen-Grandjean (*Folia Parasitol*, 28: 91-92, 1981) without nay regard to the critical conclusions published by Kudryashova (*Folia Parasitol*, 31: 265-268, 1984), who corrected his evident mistakes. It is a pity, as *N. zachvatkini* belongs to widely distributed European species and this erroneous view may result in many faunistical mistakes. Moreover, Kolebinova does mention the two papers, so that the reader of her monograph cannot make his own opinion.

The choice of the cited papers (only 56 papers altogether, 24 of them published by the author) is debatable. Even such a basic book as the mentioned monograph by Kudryashova was omitted. It would certainly be suitable to include papers concerning the neighboring countries (Rumania, Yugoslavia), especially if the author correctly writes in the introduction that her book will also be useful for the acarologists from these countries.

All these comments, however, do not detract from the value of the book. Regardless of some linguistic problems (it is published in Bulgarian), it will certainly meet with an international approval. The author should be congratulated upon this scientific achievment.

M. Daniel

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TESTACEAN AMOEBAE FAUNA (PROTOZOA, RHIZOPODA, TESTACEA) FROM THE ASIAN PART OF THE USSR (REGIONS OF THE BAIKAL LAKE AND KHABAROVSK)

Vladimír BALÍK

Institute of Soil Biology, Czechoslovak Academy of Sciences, CS-370 05 České Budějovice, Czechoslovakia

A b s t r a c t. In 9 soil, litter and moss samples from two areas from the Asian part of the USSR (south area of the Baikal Lake and environs of Khabarovsk) 87 testacean species and varieties were deteremined. The species *Centropyxis aerophila* var. *minuta*, *C. plagiostoma* var. *oblonga*, *Cornuapyxis lunaristoma*, *Corythion dubium* var. *minima*, *Cyclopyxis humilis*, *C. puteus*, *Difflugia leidyi*, *D. pulex*, *Euglypha cristata* var. *lanceolata*, *E. laevis* var. *minor*, *E. strigosa* var. *heterospina*, *Pareuglypha reticulata*, *Trinema lineare* var. *minuscula*, and *T. naviicu-laris* are new for the testacean fauna of the USSR. The variety *Trinema complanatum* var. *triangularis* var.n. is new for the science. In this work a comparison of the acquired data with the literature data about the testacean fauna of the Asian part of the USSR and the neighbouring countries was realized.

INTRODUCTION

My collaborators of the Institute of Soil Biology brought me moss, litter, and soil samples from the Far East and from the environs of the Baikal Lake. In these samples I studied the testacean fauna composition. The areas of Siberia and the Far East of the USSR are not practically investigated from this point of view. The knowledge of the testacean fauna of the USSR is almost solely restricted to the European part of the USSR (e.g. L i e p i n i s et al., 1973; K o r g a n o v a & G e l t z e r, 1972; K o r g a n o v a, 1975, 1982; G o l e m a n s k y, 1983 a, b). Data about the testacean fauna from the Asian part of the USSR were published by B r o d s k y (1945), C h i b i s o v a (1967) and G o l e m a n s k y (1971), for example. There are literature data about the testacean fauna from neighbouring countries (China: B a r t o š, 1963; F i e l d e, 1987; L a m m e r m a n, 1907; L i S u n T a i, 1931; W a n g 1925; W a n g & N i e, 1934; Z a n y i n G a w, 1941; Korea: G o l e m a n s k y, 1979; Mongolia: K o r g a n o v a, 1988).

This work is a contribution to the knowledge of the testacean fauna of the Asian part of the USSR, namely form the environs the Baikal Lake and Khabarovsk (the area of mixed and coniferous forests - light and dark taiga).

STUDY SITES

Both investigated areas are situated in the boreal zone, in mixed and coniferous forests of the northern hemisphere (so-called light and taiga) (W a l t e r, 1968) The samples from the Baikal Lake area were taken in its southern part (in Angara river outflow environ and in the Baikalski zapovednik nature reserve in the Pereyonnaya river neighbourhood). The sample from the Far East area were taken in the neighbourhood of Khabarovsk. Sketch-map see Fig. 1.

DESCRIPTION OF THE STUDIED LOCALITIES

1. USSR, Baikal Lake, neighbourhood of Listvyanka village, light taiga,birch rotten stump with thick layer of decomposed leaf litter, 29.2.1989, leg. V. Krištůfek.
2. USSR, Angara river, about 22 km from the outflow from the Baikal Lake, left riverside of the Angara river about 30 km south-east from Irkutsk, humic soil layer with semidecomposed litter, 29.9.1989, leg. V. Krištůfek.
3. USSR, Baikalski zapovednik nature reserve, fir - drooping-coned pine forest, about 900 m a.s. l., about 200 m from the riverside of the Pereyonnaya river, sphagnum carpet with leaf litter on moist boggy soil, 29.9.1989, leg. V. Krištůfek.
4. USSR, Baikalski zapovednik nature reserve, fir - drooping-coned pine forest, about 800 m a. s.l., dark taiga, undetermined moss from a dead rotten fir trunk, 29. 9. 1989, leg. V. Krištůfek.
5. USSR, Baikalski zapovednik nature reserve, boundary of the light and dark taiga, about 800 m a. s .l., about 100 m from the riverside of the Pereyonnaya river, undetermined moss and decomposed leaf litter from a dead rotten limba tree trunk, 1. 10. 1989, leg. V. Krištůfek.
6. USSR, Khabarovsk, dark taiga, moist humic soil without plant cover, 22. 11. 1987, leg. J. Rusek.
7. USSR, Khabarovsk, dark taiga, very decomposed leaf litter with fern tuft a stone surface, 22. 11. 1987, leg. J. Rusek.
8. USSR, Khabarovsk, dark taiga, leaf litter and upper humic layer in a depression between boulders, 22.11.1987, leg. J. Rusek.
9. USSR, Khabarovsk, dark taiga, forest soil with residues of leaf litter, 22. 11. 1987, leg. J. Rusek.

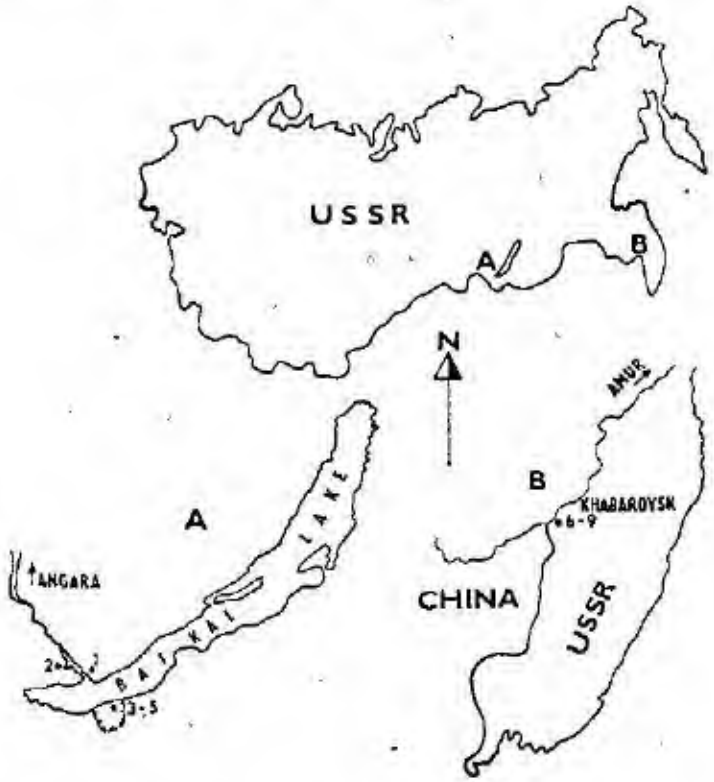

Fig. 1. Sketch-map of the studied areas. A - Baikal Lake, B - Khabarovsk

Numbers behind the scientific species name indicate localities where the respective species was found (1 - 5 - Baikal Lake, 6 - 9 - Khabarovsk). Symbol "+" indicates new testate species and varieties for the testacean fauna of the USSR. Symbol "++" indicates a new testacean variety for science.

Amphitrema flavum (Archer) Penard, 1902 - 3
Arcella catinus Penard, 1890 - 7,9
Assulina muscorum Greeff, 1888 - 2, 3, 4, 7, 8, 9
Assulina seminulum (Ehrenberg) Leidy, 1879 - 3, 7, 8, 9
Butlinularia indica (Penard) Deflandre, 1953 - 9
Centropyxis aerophila Deflandre, 1929 - 2, 6, 7, 8, 9
+ *Centropyxis aerophila* var. *minuta* Chardez, 1964 - 2
Centropyxis aerophila var. *sphagnicola* Deflandre, 1929 - 3, 4, 7
Centropyxis cassis (Wallich) Deflandre, 1929 - 7
Centropyxis constricta (Ehrenberg) Penard, 1902 - 8
Centropyxis ecornis var. *minuta* Golemansky, 1962 - 1
Centropyxis elongata (Penard) Thomas, 1959 - 2
Centropyxis orbicularis Deflandre, 1929 - 3, 5, 8, 9
Centropyxis plagiostoma Bonnet & Thomas, 1955 - 8
+ *Centropyxis plagiostoma* var. *oblonga* Chardez, 1962 - 8
Centropyxis platystoma (Penard) Deflandre, 1929 - 6, 7, 8
Centropyxis sylvatica (Deflandre) Thomas, 1955 - 5
Centropyxis sylvatica var. *minor* Bonnet & Thomas, 1955 - 1
+ *Cornuapyxis lunaristoma* Couteaux & Chardez, 1981 - 9
Corythion dubium Taránek, 1881 - 3, 4, 7, 9
+ *Corythion dubium* var. *minima* Chardez, 1969 - 4
Corythion dubium var. *terricola* Schönborn, 1964 - 3, 4
Corythion pulchellum Penard, 1890 - 3, 9
Cyclopyxis ambigua Bonnet & Thomas, 1960 - 9
Cyclopyxis eurystoma Deflandre, 1929 - 2, 3, 4
Cyclopyxis eurystoma var. *gautheriana* (Bonnet & Thomas) Bartoš, 1963 - 5
+ *Cyclopyxis humilis* Bonnet, 1962 - 1
Cyclopyxis kahli Deflandre, 1929 - 3, 8, 9
Cyclopyxis kahli var. *cyclostoma* Bonnet & Thomas, 1960 - 5
+ *Cyclopyxis puteus* Thomas, 1960 - 6, 8
+ *Difflugia leidyi* Wailes, 1912 - 6
Difflugia oblonga var. *bryophila* Penard, 1902 - 7
Difflugia oblonga var. *longicollis* Grassowsky, 1936 - 6
+ *Difflugia pulex* Penard, 1902 -6
Euglypha anodonta Bonnet, 1962
Euglypha anodonta var. *magna* Schönborn, 1964 - 3
Euglypha ciliata (Ehrenberg) Wailes, 1915 - 7, 8
Euglypha ciliata var. *glabra* Wailes, 1915 - 8
Euglypha compressa Carter, 1864 - 8
Euglypha cristata Leidy, 1879 - 6, 9
Euglypha cristata for. *decora* Jung, 1942 - 6, 8, 9
+ *Euglypha cristata* var. *lanceolata* Playfair, 1917 - 6
Euglypha dolioliformis Bonnet, 1959 - 2
Euglypha laevis (Ehrenberg) Perty, 1849, 1, 6, 7, 9
+ *Euglypha laevis* var. *minor* Penard, 1890 - 1
Euglypha pseudociliata var. *glabra* Chardez, 1962 - 7

Euglypha rotunda Wailes & Penard, 1911 - 2, 4, 6, 7, 8, 9
Euglypha rotunda var *obliqua* Decloitre, 1956 - 3
Euglypha strigosa (Ehrenberg) Leidy, 1872 - 3, 4
Euglypha strigosa var *glabra* Wailes, 1915 - 4
+ *Euglypha strigosa* var *heterospina* (Penard) Wailes & Penard, 1911 - 3
Euglypha strigosa var *muscorum* Wailes, 1898 - 3
Euglypha tuberculata Dujardin, 1841 - 6, 9
Euglyphella elegans Schönborn, 1964 - 2
Heleopera petricola Leidy, 1879 - 7, 8
Heleopera petricola var *amethystea* Penard, 1902 - 8
Heleopera picta Leidy, 1879 - 2
Heleopera rosea Penard, 1890 - 3
Heleopera sylvatica Penard, 1902 - 8
Microchlamys patella (Claparede & Lachmann) Cockerell, 1911 - 7
Nebela bohemica Taránek, 1882 - 3
Nebela collaris (Ehrenberg) Leidy, 1876 - 3
Nebela militaris Penard, 1890 - 3, 4, 5
Nebela tincta (Leidy) Awerintzew, 1906 - 3
Nebela tubulosa Penard, 1890 - 8
Nebela vitraea Penard, 1902 - 8
+ *Pareuglypha reticulata* Penard, 1902 - 8
Phryganella acropodia (Hertwig & Lesser) Hopkinson, 1909 - 2, 3, 4, 7, 8, 9
Phryganella hemisphaerica Penard, 1902 - 3, 7
Phryganella paradoxa Penard, 1902 - 5
Phryganella paradoxa var *alta* Bonnet & Thomas, 1960 - 3
Plagiopyxis callida Penard, 1910 - 2, 4, 6, 8, 9
Plagiopyxis declivis Thomas, 1955 - 2, 7, 9
Plagiopyxis oblonga (Bonnet & Thomas) Bonnet & Thomas, 1960 - 8
Quadrulella symmetrica (Schulz) Wallich, 1863 - 9
Tracheleuglypha acolla Bonnet & Thomas, 1955 - 2, 6, 8
Tracheleuglypha dentata (Vejdovsky) Deflandre, 1928 - 8
Trigonopyxis arcula Penard, 1912 - 3, 4
Trinema complanatum Penard, 1890 - 3, 4, 5, 7, 8
++*Trinema complanatum* var *triangularis* var n - 4
Trinema enchelys (Ehrenberg) Leidy, 1878 - 2, 6, 7, 8, 9
Trinema grandis (Chardez) Golemansky, 1963 - 8, 9
Trinema lineare Penard, 1890 - 1, 2, 3, 4, 5, 6, 7, 8, 9
+ *Trinema lineare* var *minuscula* Chardez, 1971 - 2, 3, 4
+ *Trinema navicularis* Decloitre, 1973 - 7, 8
Trinema penardi Thomas & Chardez, 1958 - 2, 8
Trinema verrucosum Francé, 1898 - 6

DESCRIPTIONS OF THE NEW TESTACEAN SPECIES AND VARIETIES FOR THE FAUNA OF THE USSR

Centropyxis aerophila var. *minuta* Chardez, 1964 Fig. 2

D e s c r i p t i o n : Shell from bottom view elliptic, in first third mild choke, from side view elliptic or drop-type with distinct separate aperture part. Shell surface covered with rare dispersed flat and in size different mineral fragments and grains. Shell pellucid, translucent, light brown. Aperture oval to almost round, in the low part of shell, often suggestion of plagiostomy.

D i m e n s i o n s: Length 33 - 37 μm, breadth 19 - 22 μm, thickness of aperture part of shell 11 - 13 μm, thickness of apical part of shell 17 - 21 μm, aperture 9 - 11 μm x 4 - 8 μm.

E c o l o g y: Aerophytic dry and moist mosses, humic soil layer, litter.

G e o g r a p h i c a l d i s t r i b u t i o n: Belgium, Faroe Islands, France, Rumania, Spitzbergen, Zaire, Iran, French Guyana, Oceania.

Table 1. List of determined testacean families with numbers of species

Family	Number of species
Amphitrematidae	1
Arcellidae	1
Centropyxidae	20
Difflugiidae	4
Euglyphidae	25
Hyalospheniidae	12
Microchlamyidae	1
Phryganellidae	4
Plagiopyxidae	4
Trigonopyxidae	2
Trinematidae	13
total	*87 species*

Table 2. Numbers of determined species and mean abundances (in ind . g $^{-1}$) on the separate localities

Locality no.	Number of species	Mean abundance
1	6	11 400
2	17	15 500
3	28	29 600
4	19	20 500
5	8	9 500
6	17	12 600
7	22	27 000
8	33	31 700
9	19	21 400

Centropyxis plagiostoma var. *oblonga* Chardez, 1962 Fig. 11

D e s c r i p t i o n: Shell from bottom view broad oval, practically oblong with rounded edge. From side view egg-shaped with lower part in the aperture area. Surface of the shell covered with the mineral particles of different shape and size. Shell translucent, colorless to light yellow. Aperture oval, relative small, mild invaginated into the shell, in lower part of the shell. Mineral particles around the aperture constitute its undulate border.

D i m e n s i o n s: Length 80-89 μm, breadth 36-42 μm, thickness of aperture area of the shell 12-16 μm, thickness of the apical area of the shell 19-25 μm, aperture 9-1 x x 5-7 μm.

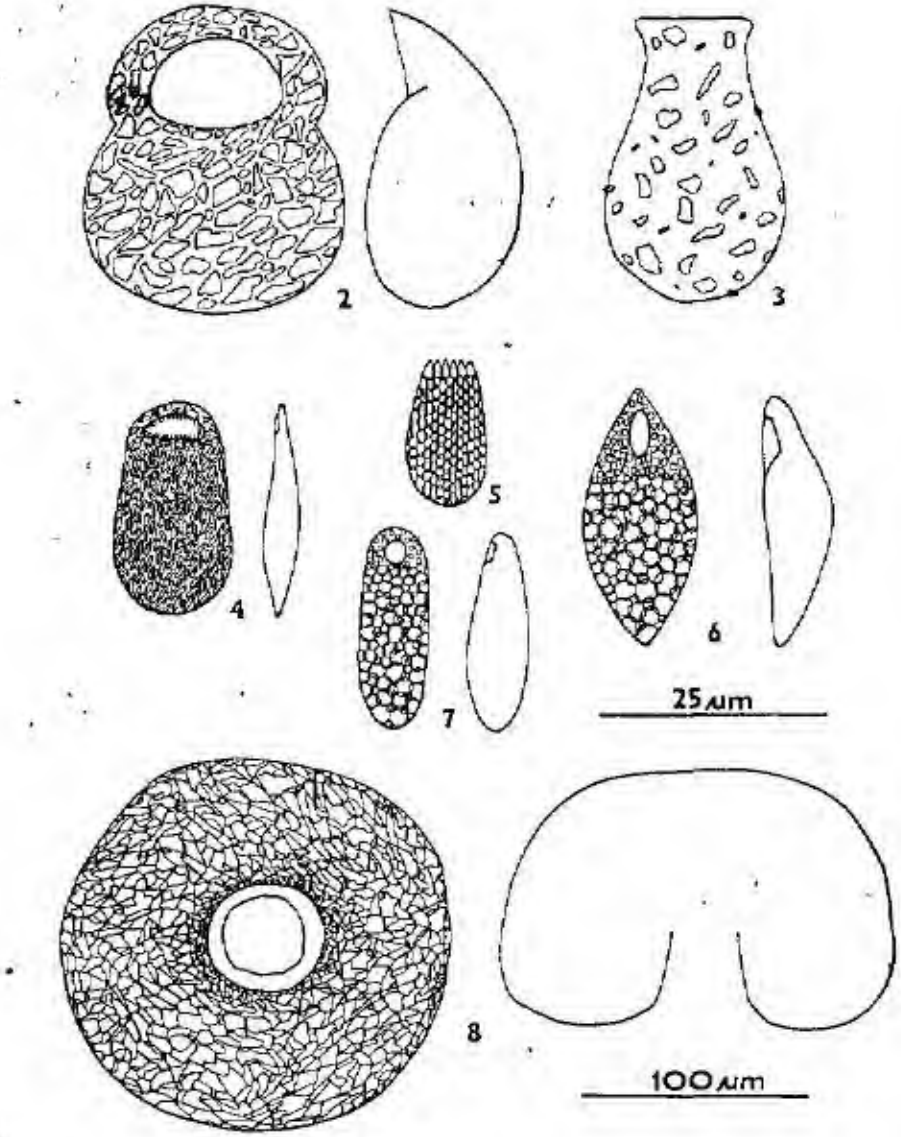

Fig. 2. *Centropyxis aerophila* var. *minuta* Chardez
Fig. 3. *Difflugia pulex* Penard
Fig. 4. *Corythion dubium* var. *minima* Chardez
Fig. 5. *Euglypha laevis* var. *minor* Penard
Fig. 6. *Trinema navicularis* Decloitre
Fig. 7. *Trinema lineare* var. *minuscula* Chardez
Fig. 8. *Cyclopyxis puteus* Thomas

Ecology: Aerophytic moist and very moist mosses, humic soil layer, coniferous and leaf litter.
Geographical distribution: Belgium, French Guyana.

Cornuapyxis lunaristoma Couteaux & Chardez, 1981 Fig. 10

Description: Shell from bottom view circular, from side view hemispheric with low depression in the bottom side. Shell surface formed at the bottom side from very fine mineral grains, at the upper surface of the shell formed of large mineral fragments and grains. Shell opaque, light brown. Aperture crescent-like, in the centre of the bottom side of the shell. Indication of the plagiostomy is perceptible. This genus creates probably the transition between the genera *Cyclopyxis and Plagiopyxis.*

Dimensions: Diameter of shell 131 - 167 µm, height 62- 77 µm, aperture 52 - 56 x x 12 - 17 µm.

Ecology: Decomposed leaf litter, epiphytic plant and mosses.
Geographical distribution: Belgium, French Guyana.

Corythium dubium var. *minima* Chardez, 1969 Fig. 4

Description: Shell oval, from side view very flattened. Organic matter of the shell covered with chaotic deposited small oval plates which do not touch one another. Shell pellucid, colorless, transparent. Aperture elliptic of semicircular with fine denticulated border.

Dimensions: Length 16 - 24 µm, breadth 8 - 11 µm, thickness 3 - 8 µm, aperture 3 - 5 x 1 - 2 µm.

Ecology: Moist and very moist aerophytic mosses, moist humic soil horizon, benthos.
Geographical distribution: Belgium, Czechoslovakia, Faroe Islands, Iceland.

Cyclopyxis humilis Bonnet, 1962 Fig. 12

Description: Shell from bottom view circular, from side view practically circular, in general sphere-like with flattened cap. Shell covered with colourless mineral fragments and grains and with decomposed diatomae frustules. Shell transparent, colorless to decrepit yellowish. Aperture relative small, circular, mild invaginated.

Dimensions: Diameter of shell 42 - 49 µm, height 39 - 44 µm, diameter of aperture 9 - 13 µm, invagination 6 - 10 µm.

Ecology: Humic and mineral soil horizont, litter.
Geographical distribution: Belgium, Rumania, Philippines, Argentina.

Cyclopyxis puteus Thomas, 1960 Fig. 8

Description: Shell large, from bottom view circular, from side view hemispheric to almost circular. Surface of the shell constituted of fine mineral particles. Shell opaque, rusty brown. Aperture circular in the center of the bottom side, with hyaline border. Aperture on the end of cone tube which is half the height of shell.

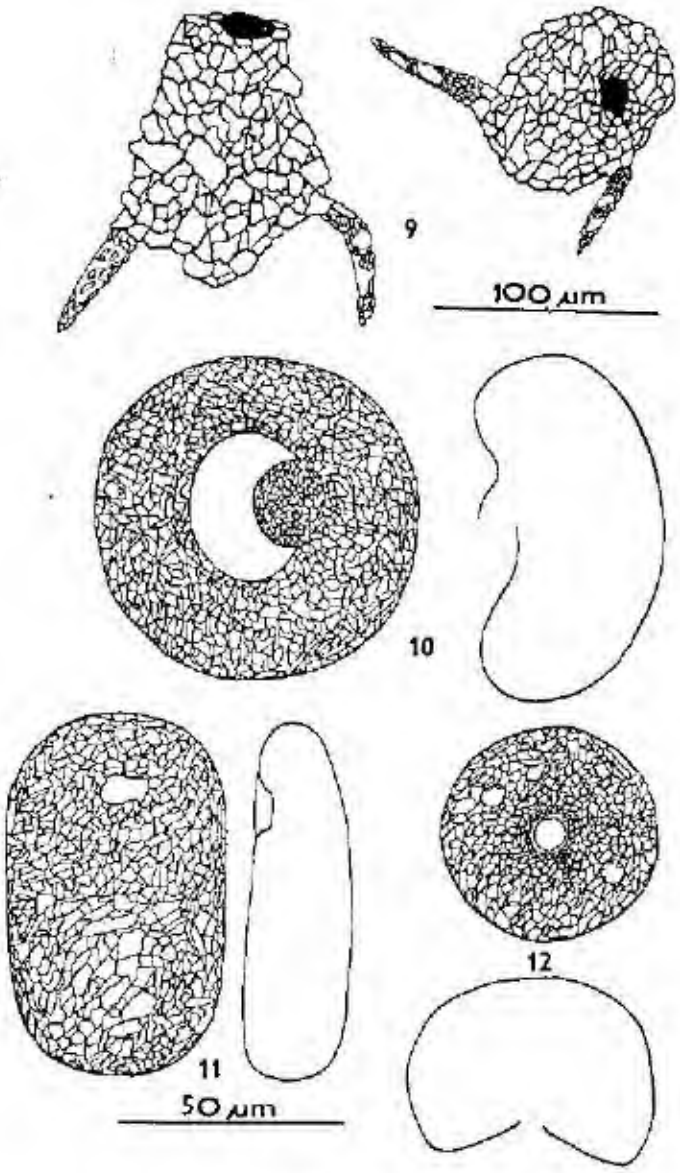

Fig 9 *Difflugia leidyi* Wailes
Fig 10 *Cornuadpyxis lunaristoma* Couteaux et Chardez
Fig 11 *Centropyxis plagiostoma* var *oblonga* Chardez
Fig. 12 *Cyclopyxis humilis* Bonnet

Dimensions: Diameter of shell 152 - 172 µm, height 124 - 139 µm, basis diameter of cone tube 48 - 56 µm, lenght of cone tube 56 - 68 µm, diameter of aperture 26 - 38 µm.

Ecology: Moist soil, litter.

Geographical distribution: Belgium, France, Germany, Poland, Rumania, Great Britain, Guinea, Zair, Nepal, French Guyana, Canada, Mexico, Paraguay.

Difflugia leidyi Wailes, 1912 Fig. 9

Description: Shell pear-like or vase-like, in cross section circular. Periphery of the shell irregular undulate owing to different shapes of mineral fragments on the surface of the shell. On the apical pole of the shell usually two long hollow spines (rare 3 or absent). Surface of the shell covered with large mineral grains and fragments. Surface of the spines covered with fine mineral grains or mineral particles are absent. Shell opaque, gray-brown or brown. Aperture circular with irregular undulate border, often excentric.

Dimensions: Length 96 - 110 µm, diameter on apical pole 79 - 88 µm, diameter on the aperture area 46 - 52 µm, diameter of aperture 33 - 39 µm, diameter of spines 12 - 19 µm.

Ecology: Very moist aerophytical mosses, submerged mosses, *Sphagnum*, benthos.

Geographical distribution: Belgium, Czechoslovakia, Germany, Austria, Shetland Islands, Great Britain, Algeria, Gabon, Ivory Coast, Zair, India, Canada, USA.

Difflugia pulex Penard, 1902 Fig. 3

Description: Shell pear-like, midle choke, in cross section circular. Composed practically of pseudochitinous organic matter only, on the surface single mineral parcticles and small pieces of organic detritus. Shell pellucid, transparent, yellowish-brown to chocolate brown. Aperture large, circular.

Dimension: Length 33 - 36 µm, diameter of shell 16 - 22 µm, diameter of aperture 11 - 14 µm.

Ecology: Very moist aerophytical mosses, submerged mosses, *Sphagnum*, benthos.

Geographical distribution: Belgium, Czechoslovakia, Faroe Islands, Greenland, Italy, Yugoslavia, Netherlands, Germany, Poland, Austria, Rumania, Spain, Spitzbergen, Great Britain, French West Africa, Guinea, Congo, Java, Argentina, USA, Venezuela, Australia.

Euglypha cristata var. *lanceolata* Playfair, 1917 Fig. 14

Description: Shell vase-like to almost cylindroid, in cross section circular, basal part of shell terminate with sharp edge (lanceolate). On the basis of shell a bunch of 8 - 16 spines with different size. Shell surface covered with oval practically uncoincidate plates, indistinct hexagonal structure. Shell pellucid, transparent, colorless. Aperture circular, rim of 7 - 9 plates with fine denticular border.

Dimensions: Length 42 - 46 µm, diameter of shell 16 - 19 µm, diameter of aperture 7 - 9 µm, length of spines 7 - 19 µm, plates 3 - 5 x 1.5 - 2 µm.

Ecology: Moist to very moist aerophytical mosses, *Sphagnum*.
Geographical distribution: Guinea, Australia.

Euglypha laevis var. *minor* Penard, 1890 Fig. 5

Description: Very small egg-shape shell with cut off narrow pole, from side view flattened, infrequent concave. Surface from oval plates, in light microscope visible hexagonal structure. Shell pellucid, transparent, colourless. Aperture elliptic, rim of the 7 - 9 egg-shaped plates with triangular narrow pole.

Dimensions: Length 12 - 16 µm, breadth 6 - 8 µm, thickness 3 - 6 µm, plates 1 - 1.5 x 0.3 - 0.5 µm, aperture 3 - 4 x 1.5 - 2.5 µm.

Ecology Dry and moist aerophytical mosses, humic soil horizon.
Geographical distribution: Belgium, Austria, Rumania, Swiss, Columbia, Australia, Antarctic.

Euglypha strigosa var. *heterospina* (Penard) Wailes & Penard, 1911 Fig. 13

Description: Shell pear-shaped, from side view flattened, infrequent middle concave, in cross section oval to lenslike. Surface of the shell of oval or hexagonal plates. On the periphery of the shell single or in groups of two spines of different size. Shell pellucid, colorless, transparent. Aperture elliptic, rim of 10 - 11 plates with 5 dents.

Dimensions: Length 52 - 73 µm, breadth 32 - 48 µm, thickness 21 -26 µm, plates 7 - 10 x 3 - 5 µm, aperture 19 - 22 x 8 - 11 µm, length of spines 7 - 24 µm.

Ecology: Permanent moist unsubmerged aerophytical mosses, *Sphagnum*
Geographical distribution: Belgium, Bulgaria, Czechoslovakia, France, Germany, Shetland Islands, Swiss, Great Britain, Canada, USA.

Pareuglypha reticulata Penard 1902 Fig. 15

Description: Shell vase- or pear-shaped, often asymmetrical, in cross section oval to circular. On shell basis one hollow spine with changing size, often curved. Shell covered with oval or circular plates of different size. Shell pellucid, transparent, colourless to light yellow. Aperture circular, rim of round plates or only of pseudochitinous matter (hyaline undulate collar).

Dimensions: Length 56 - 96 µm, diameter of shell 36 -58 µm, length of spine 26 - 53 µm, diameter of aperture 22 - 39 µm.

Ecology: Very moist aerophytical mosses, *Sphagnum*, moist litter, benthos.
Geographical distribution. Belgium, Czechoslovakia, Netherlands, Swiss, Congo

Trinema complanatum var. *triangularis* var.n. Fig. 16

Description: Shell from bottom view triangular with rounded edge. From side view drop-type or loaf-like with narrow part in the aperture area. Surface of the shell covered with circular plates of two different sizes. Small plates dominate on the aperture area, on the rest of the shell large plates. Shell pellucid, transparent, colourless. Aperture circular, relative small, without exception in the narrow and broad part of the shell. The border of aperture with fine dents.

Dimensions: Length 42 - 44 µm, breadth of aperture part of shell 33 - 37 µm, breadth of apical part of shell 8 - 14 µm, thickness of aperture part of shell 5 - 8 µm, thickness of apical part of shell 11 - 14 µm, diameter of large plates 2 - 3 µm, diameter of small plates 0.5 - 1.5 µm, diameter of aperture 3 - 6 µm.

Protoplasm: Colourless, pellucid, one nucleus, one contractile vacuole, several food vacuoles. Pseudopodia threadlike, thin, always several together.

Remark: This variety is a shape variety of the type species *Trinema complanatum*. It is typical with triangular shape and with dislocation of two plates of different sizes. In dimensions it does not differ from the type species (biometrical characteristics see Tab. 3.

Locus typicus: USSR, Siberia, Baikal Lake, Baikalski zapovednik nature reserve, fir - drooping-coned pine forest, dark taiga, about 800 m a.s.l., moss from a dead rotten fir trunk, 29.9.1989, leg V. Krištůfek.

Ecology: Moist and very moist aerophytical mosses.

Type material: Holotypus and 3 paratypus slides are in the authors collection of testate amoebae, Institute of Soil Biology, České Budějovice, Czechoslovakia.

Table 3: Biometrical characteristics of the *Trinema complanatum* var. *triangularis nov.* var. x - arithmetic mean, M - median, s - standard deviation, V - coefficient of variation, Min - minimum value, Max - maximum value, n - number of specimens. All dimensions in µm

Character	x	M	s	V	Min	Max	n
Length of shell	42.69	42.0	0.95	2.23	42.0	44.0	36
Breadth of aperture part	35.05	35.0	1.35	3.85	33.0	37.0	36
Breadth of apical part	9.53	9.0	1.90	19.94	8.0	14.0	36
Thickness of aperture part	6.17	6.0	1.18	19.12	5.0	8.0	36
Thickness of apical part	12.25	12.0	0.91	7.43	11.0	14.0	36
Diameter of aperture	4.31	4.0	0.92	21.35	3.0	6.0	36

Trinema lineare var. *minuscula* Chardes, 1971 Fig. 7

Description: Very small long oval shell with practically parallel long sides, on cross section elliptical. Shell surfaces covered with circular, irregular overlapping plates. Shell pellucid, transparent, colourless. Aperture small, circular.

Dimensions: Length 17 - 22 µm, breadt 6 - 7 µm, thickness 5 - 6 µm, diameter of aperture 2 - 4.5 µm, diameter of plates 0.5 - 1.5 µm.

Ecology: Dry and moist aerophytical mosses, rhizoplan of several plants, sea interstitial.

Geographical distribution: Belgium, Czechoslovakia, France, Iceland, Spain, Spitzbergen, Congo, Ivory Coast, French Guyana.

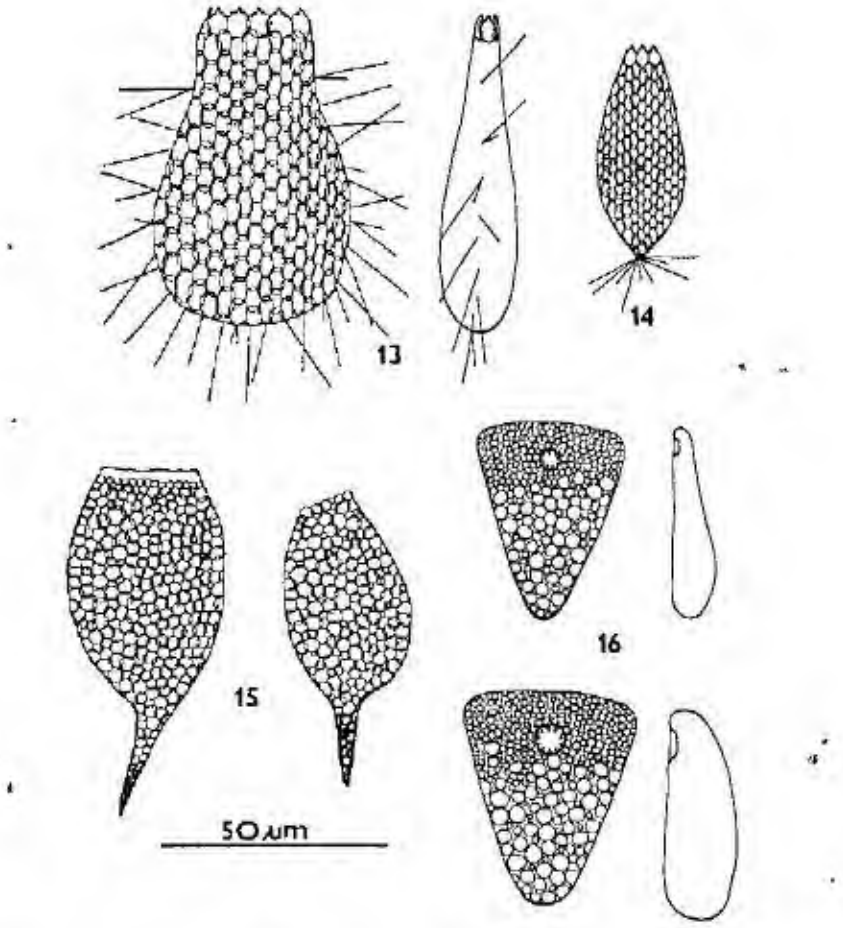

Fig 13 *Euglypha strigosa* var *heterospina* (Penard) Wailes et Penard
Fig 14 *Euglypha crenata* var *lanceolata* Playfair
Fig 15 *Pareuglypha reticulata* Penard
Fig 16 *Trinema complanatum* var *triangularis* var nov

Trinema navicularis Decloitre, 1973 Fig. 6

D e s c r i p t i o n : Shell from bottom view elliptical with sharp edge on front and posterior shell ends (small boat-like). From side view shell loaf-like with narrow parts in front and posterior shell ends Shell surface covered with large irregular overlapping circular plates. Near aperture small separate plates. Shell pellucid, transparent, colourless. Aperture oval to egg-shapes, long axis of the aperture parallel with the longest axis of the shell.

D i m e n s i o n s : Length 32 - 38 µm, breadth 14 - 17 µm, thickness 12 - 17 µm, diameter of large plates 9 - 13 µm, diamater of small plates 2 - 4 µm, aperture 9 - 13 x x 6 - 9 µm

E c o l o g y Dry aerophytical mosses, lichens

G e o g r a p h i c a l d i s t r i b u t i o n Belgium, France, Galapagos Islands

Altogether on the two studied areas from the Asian part of the USSR (9 localities) 87 species and varieties of testate amoebae from 11 families and 21 genera were found (Tab. 1). From this number 14 species are new for the USSR (11 species out of them are new for Asia). *Trinema complanatum* var. *triangularis* var. nov. is a new variety for science.

The families Euglyphidae (25 species), Centropyxidae (20 species), Trinematidae (13 species), and Hyalopheniidae (12 species) were the most abundant on studied localities. The genera *Euglypha* (19 species) and *Centropyxis* (13 species) were common genera in the testacean communities studied.

ECOLOGICAL REMARKS

Both areas studied belong phytocoenologicaly to the boreal zone of mixed and coniferous forests of the northern hemisphere (taiga). Moss, litter and soil samples from the leafy (light) taiga and from the coniferous (dark) taiga were acquired.

The testacean communities from the Baikal Lake area and from the environs of Khabarovsk are different. The differences between those communities are evident in their qualitative (Baikal Lake - 53 species, 14 genera; Khabarovsk - 55 species, 18 genera). In the Baikal Lake area the genera *Bulinullaria, Cornuapyxis, Difflugia, Pareuglypha, Microchlamys* and *Quadrullela* were not found. In the Khabarovsk area members of the genera *Amphitrema, Euglyphella* and *Trigonopyxis* were not found. From the quantitative point of view expressive differences were not found. Abundances in both areas ranged from 20 000 to 30 000 ind. g^{-1} dry weight (Tab. 2). Certain differences were found in abundances of particular testacean species. In the Baikal Lake area following species were the most abundant (mean abundance in ind . g^{-1}): *Assulina muscorum* (2 500), *A. seminulum* (1 500), *Cyclopyxis eurystoma* (2 400), *Euglypha strigosa* (4 400), *Nebela militaris* (1 200), *Phryganella acropodia* (8 400), *Trigonopyxis arcula* (1 300), *Trinema lineare* (2 300), and *T. lineare* var. *minuscula* (2 300), respectively. In the Khabarovsk area following testacean species had high abundances (mean abundance in ind . g^{-1}): *Assulina muscorum* (2 500), *A. seminulum* (1 500), *Centropyxis aerophila* (6 000), *C. platystoma* (2 300), *Cyclopyxis ambigua* (2 000), *Euglypha laevis* (2 400), *E. rotunda* (1 500), *Phryganella acropodia* (4 500), *Plagiopyxis callida* (1 500), *Tracheleuglypha acolla* (1 200), *Trinema enchelys* (7 400), and *T. lineare* (4 600) respectively.

The testacean communities of both areas studied were characterized by high abundance in species of the aerophytical mosses (dry and permanent moist) and by the presence of euryvalent species with cosmopolitan distribution. The soil and aquatic testacean species were in minority.

Most literature data about the testaceans from that area refer to other biotops and habitats than this work (water, sea interstitial, caves), and that is why there are but few

comparable data. B a r t o š (1963) shows from the moss samples from the Kanton environs (China) 34 testacean species. This region differs climatologically from areas in the USSR studied in this work. The species composition found by B a r t o š agrees with the testacean communities studied in this work in the euryvalent species only. K o r g a n o v a (1988) shows 64 testacean species from a forest steppe in Mongolia, which is less than in the studied areas in the USSR. The species composition between the USSR and Mongolia is comparable especially in the euryvalent species, but there is a certain correspondance among the species of aerophytical mosses, too. On the localities in the USSR and in Mongolia the species of the families Centropyxidae and Euglyphidae were the most abundant. In the Mongolian soils a higher abundance (about 100 000 ind . g^{-1}) was determined than it is the case of the areas studied here (about 30 000 ind . g^{-1}).

The studied testacean communities from the Siberian taiga have similar species composition as were determined in the mountain coniferous forest in the Central and Northern Europa (e.g. Alps, Giant Mountains). The fact that 10 out 11 species underscribed from Asia up to now occur in Central and Northern Europe may be considence as evident.

Acknowledgement

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BOOK REVIEW

Montagu A.: *Growing Young*. 2nd edition. Massachussets: Bergin & Garvey Publ., 1989, 292 pp. Price not stated.

A new completed edition of the book by the prominent American anthropologist, author of more than 50 scientific books on various basic questions of the science of man, on general biological questions and on many problems of civic and international life (e.g. Anthropoly of Human Nature, Life before Birth, On being Human, Man's most Dangerous Myth, The Nature of Human aggression, The Natural Superiority of Women, The Peace of the World, The Human connections, etc.). A. Montagu was gradually professor on the most known American universities like Harvard, Columbia University, Univ. of California, Rutgers Univ.,, Princeton Univ. etc. In his 87 year, he is still fully active scientifically and continuous to work on number of new questions.

The present book which might called the monograph on the regularity of neoteny of man is subdivided into eight chapters (Introduction, Neoteny and Human Biological Evolution, The Evolution of Human Behavior, Advantages of Immaturity: A Womb with a View, The Child, The Neotenous Traits of the Child, Those who, the Cods Love, Import), with an Appendix (the History of Neoteny) (77 Tables and 14 Figs which were not in the first edition) Among other things, he highly appreciates the contribution to these questions of our Laboratory of Evolutionary Biology.

The author deals in detail with individual aspects of neoteny and its import in both onthogenetic and phylogenetic development of man from the point of view of morphology, physiology, ethology and psychology and he discusses in detail the main objections which have been raised against the conception of the earlier author by the many, even the most prominent recent biologists like e.g. T. Dobzhansky, E. Mayr, D. Morris, E. Smith and others. It is shown that these are based mostly in misunderstandings and they do in no case throw any doubt on the principle of this one of the main mechanisms of the evolution of man.

In the concluding chapter, the "Import" which is the culmination of the book, the author attempts to evaluate and utilize the notions on neoteny for an improvment of human education and a principal transformation of teaching and the school system in total. He emphasize the import of learning in detail the real needs of all individual phases of the child's development to insure its full aninjured intelectual development. The neotenic character of the child is evident in its passion for learning new things, the readiness of its mind for new ideas, its high degree of imaginations and the need for independence together with tender loving care. As he says "An unhurried childhood, rich in varieties of experiences, which recognize the uniqueness of each child, is what the child requires. As humans this is how we are designed to grow and develop". The views on the optimum methods of education in individual stages may differ, but the advantage of this principle seems to have been shared by all educationists.

No less important and progressive are the Montague's conclusions on the adult aging. Here he emphasizes in agreement with the recent research, that the intelectual ability does not decrease with the age and that, with appropriate exercise and training it may even increase. In this way man's juvenile, neotenic character may further improve in favour of the general state of health. This is the actual meaning of the term "growing young".

The whole author's approach shows a deep genuine humanism of the author. He thus reaches the position and level of such great world thinkers and personalities like J. A. Comenius, J. J. Rousseau, L. N. Tolstoy and others. The book may be thus not only an important contribution to the problem of neoteny in man, but at the same time an original and unique attempt and stimulous to utilize the biological notions on this phenomenon for solving important educational, gerontological, sociological and psychological problems.

V. J. A. Novák, F. Korselt

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MORPHOMETRICAL AND ECOLOGICAL NOTE ON POLYPTERUS SENEGALUS (PISCES, POLYPTERIDAE) FROM THE RESERVOIR GEBEL AULIA (SUDAN)

Lubomír HANEL[1] & Abdel Moneim KHALID[2]

Management of Protected Landscape Area Blanik, CS-257 06 Loučovice 8, Czechoslovakia[1]
Fisheries Research Centre, p o box 1459, Khartoum, Sudan[2]

A b s t r a c t. The morphometrical analysis of 7 specimens of *Polypterus senegalus* Cuvier, 1829 from the reservoir Gebel Aulia (Sudan) is presented together with morphological description of one specimen with lacking pelvic fins. Some ecological notes on fish habitat are also given.

INTRODUCTION

Polypterus senegalus was described firstly by C u v i e r in 1829, but his description is unsufficient. The whole description represents only the note that another species of bichir living in Senegal has only 12 dorsal finlets (*Polypterus senegalus*). Here an interesting note is also added: that its flesh is tasteful. Following D a g e t (1954) *P. senegalus* has a wide range of distribution. It inhabits the drainage of the Niger, Senegal, Gambia, Volta, Nile, Omo and Congo rivers. It is also found in Rudolph Lake and Albert Lake.

B o u l e n g e r (1909) examined 97 specimens from various localities (the White Nile, the rivers Baro, Bahr-el-Gebel, Senegal, Gambia, Niger, Benue and No, Albert and Rudolph Lakes. Up to now two subspecies were described: *P. senegalus senegalus* Cuvier, 1829 (terra typica - Senegal, distributed also in Gambia, Niger and Volta), and *P. senegalus meridionalis* Poll, 1942 (terra typica Katanga, see D a g e t (1954). In the meristic and morphometric criteria the subspecies of *P. senegalus* show so little differences that the validity of these taxa seems to be questionable (Č i h a ř, 1972). *P. senegalus* is also rarely kept in captivity (A r n o u l t, 1966). For anatomical features of this species with regard to another species of the genus *Polypterus* see e. g. P o l l & D e s w a t t i n e s (1967) and D a g e t (1950).

MATERIAL AND METHODS

Our own material (n = 7) was captured in the reservoir Gebel Aulia on Nov. 16, 1989 (locality Redese). This reservoir lies on the the river Nile south of the city of Khartoum. All specimens under study were preserved in 10% formalin solution. Measurments were made following O l i v a & O p a t r n ý (1959). Plastic and meristic characters were studied from the left side of the body. The number of scales in the lateral line is taken as the sum of all scales to the end of the body scalation regardless of whether the single scales are with or without the pit.

RESULTS AND DISCUSSION

Morphometric characters of the material from the reservoir Gebel Aulia (n = 7): body length 217-252 mm, ave. 232.4 ± 6.195 (=standard error of the mean), weight 75-122 g, ave. 92.7 ± 7.495.

I. Plastic characters

In % of the body length: max. body depth 12-15 (13.2 ± 0.318), max. body width 11-13 (11.6 ± 0.223), predorsal distance 33-37 (34.6 ± 0.775), preventral distance 65-68 (66.2 ± 0.534), preanal distance 85-89 (86.5 ± 0.411), head length 15-217 (15.9 ± 0.201), head width 9-11 (9.9 ± 0.138), head depth 7-9 (7.8 ± 0.162), preorbital distance 3.3-3.8 (3.6 ± 0.063), postorbital distance 10.1-10.9 (10.4 ± 0.129), interorbital distance 3.7-4.5 (4.0 ± 0.097), eye diameter 1.9-2.3 (2.1 ± 0.051), gular bone length 8.3-9.6 (9.1 ± 0.189), gular bone max. width 3.1-4.1 (3.4 ± 0.134), caudal peduncle length 8-9 (8.1 ± 0.271), caudal peduncle depth 6-7 (6.3 ± 0.1665), caudal peduncle width 3-4 (3.5± 0.174), anal fin height 7-8 (7.7 ± 0.170), anal fin length 4-6 (4.9 ± 0.299) anal fin base width 0.5-1.8 (1.0 ± 0.184), pectoral fin length (together with its peduncle) 12-14 (12.9 ± 0.243), pectoral fin length 6-8 (6.3 ± 0.273), length of its dorsal ray 4-5 (4.3 ± 0.186).

In % of head length:

head width 61-65 (62.5 ± 0.559), preorbital distance 22-23 (22.4 ± 0.229), eye diameter 13-15 (13.4 ± 0.304).

In % of interorbital distance:

eye diameter 47-58 (53.0 ± 1.389).

In % of gular bone length:

its max. width 35-43 (37.0 ± 1.183).

II. Meristic characters

D 9-10 (9.4 ± 0.202), A 11-14 (12.9 ± 0.459), P 33-37 (35.6 ± 0.612), V 11-12 (11 5 ± 0.224), linea lateralis 56-58 scales (56.9 ± 0.291), prespiracular (spiracular) postspiracular plates on the left side of the head 3/2/3-4, on the right side of the head 3/2-3/3-4. Scales in transversal series 34-37 (36.3 ± 0.474), predorsal scale rows 16-20 (17.9 ± 0.553).

Our results compared with literary data show the agreement in meristic characters with material of this species sampled in 1905-1907 in the White Nile by the late traveller B. Machulka (see Čihař, 1970), n=8, standard length 67-388 mm, from the territory somewhat southwards. Plastic characters agree also with samples compared from various parts of African territory. Our material cannot be included into the nominal subspecies, nor to the subspecies *meridionalis*, nor to the material examined by Boulenger (1909, see Table 2.) On the differences are very small and in cited sources statistically evaluated characteristics from single localities are lacking. Only from the papers of Boulenger (1907) and Daget (1954) the statistical comparison of several characters can be realized. In the case of Daget's data, it is possible to calculate statistical parameters only for finlets. Boulenger (1907) published the table of measurements of 17 selected specimens originating from nine localities (Fashoda, Galeba, L. Rudolphi; Tsutyaba, L.Albert, Kaedi, Senegal; Tewtikyeh, White Nile,

Mureji, Niger; Chaerb-el-Aish, White Nile; Charb-el-Aish, White Nile; Goz abu Gumaah, White Nile; Abo, Niger). When we compared own our data with values given by Boulenger (1907) and Daget (1954), no significant differences were found.

Among studied specimens one was found with the lacking pelvic fins (Figs. 1,2)*) This is interesting with regard to the relative genus *Calamoichtys*. The decriptiom of the anomal specimens (without ventrals) follows separatelly: body length 252 mm, total length 270 mm, weight 117 g. In % of the body length : max. body depth 13.1, max. body width 11.1, predorsal distance 32.9, preanal distance 85.9, head length 15.5, head width 9.5, head depth 7.7, preorbital distance 3.6, postorbital distance 10.1, interorbital distance 4.2, eye diamater 2.2, gular bone length 8,7, gular bone max. width 3.3, caudal peduncle length 7.7, caudal peduncle depth 6,2, anal fin height 8.3, anal fin base length 5.9, anal fin base width 1.6, pectoral fin length (together with its peduncle), 12.7, pectoral fin length 5.9, length of 1st dorsal ray 4.8, D 9, A 11, F 33, linea lateralis 57 scales, transversal scale rows 35, prespiracular plates/spiracular plates/postspiracular plates on the lefth of the body 3/2/3, on the right side of the body 3/3/3. The belly was covered wholy with scales, without marks of inury (see Fig 1, 2). In all specimens studied the arrangement of the lateral line was very interesting, because it was incomplet. In all specimens the first 7-10 scales were without lateral line pores. The perforation of the corresponding number of scales appeard one row always one row above.The remaining part of the lateral line was formed from perforated and unperforated scales. But when the pore in single scale was lacking here, no perforated "reserve" scale was found above or below the lateral line. The composition of scales in the lateral line is summarized in Tab. 1.

Table 1. The arrangement of lateral line scales in *Polypterus senegalus* from Gebel Aulia Reservoir. Nonperforated scales of the lateral line (in round brackets), scales with pores (without round brackets).

body length (mm)	total numbers of scales in the lateral line	arrangement of scales
217	56	(9), 28, (1), 8, (1), 2, (1), 3, (1), 1, (1)
247	56	(8), 23, (1), 2, (4), 1, (17)
219	57	(7), 10, (1), 25, (1), 25, (1), 1, (9), 44, (1), 1, (2)
235	57	(9), 44, (1), 1, (2)
228	57	(10), 3, (1), 9, (1), 15, (1), 5, (1), 2, (1), 3, (1), 2, (1), 1
252	57	(8), 42, (1), 1, (1), 2, (2)
219	58	(9), 39, (1), 4, (1), 1, (1), 2

*) The figures 1 and 2 will be found at the end of this issue.

III. Ecological notes

From the data of D a g e t (1954) it is possible to calculate the relationship between the length and weight of his specimens (body length 80-230 mm): $\log_W = 2.8532 \log BL - 4.7075$. When our data were compared with this equation we ascertained the average difference -7 g at ranges +3 upto -17 grams. D a g e t (1954) calculated values of K (Fulton's coefficient) between %0.74-0.98. From his table the general tendency to the decrease of this coefficient with the increasing body length is evident. Range of the index K on our material ranged between 0.68 upto 0.81 (ave. 0.74).

B o u l e n g e r (1907) examined 320 specimens from various localities (most specimens originate from the White Nile, localities Gharb-el-Aish and Fashoda). His largest specimen measured 420 mm. He supposed 500 mm appears to be the maximum length attained by this species.

In Sudan waters three species of the genus *Polypterus* are reported: *Polypterus senegalus*, *P. bichir* and *P. endlicheri*. P o n c e l k o et al. (1964) found the frequency of *P. senegalus* to be 0.4% of the total biomass of all fish species sampled by nets with 20 mm meshes in Lakes Aliab, Shanbe, Jor and No. Large meshes were not successful. In southernn part of Gebel Aulia reservoir the fish of the genus *Polypterus* (apparently all species living here) were caught using nets with meshes of 70 mm with a langer part in the total biomass (3.6%), in nets with meshes of the side length 100 mm the biomass agein increased upo to 10%, and finally in 110 mm meshes the representation of *Polypterus* species reached 29% of the biomass. Apparently most frequent were the large species found in this region, *Polypterus bichir* and *P.endlicheri*. It was observed that *Polypterus bichir* survives a long time on dry earth (between one to two hours). All three polypterids are very strong fighters in a net. Many individuals can escape due to their slim rounded body. Polypterids are mainly found in shallow muddy places near shores covered with aquatic weeds. B o u l e n g e r (1907) cited first observations on the habits of *Polypterus senegalus* made by J. S. Budgett in the Gambia in 1899. In June and July sexually mature individuals were taken in numbers together; about three-fifths were females. For long periods the fish lies in the mud at the river bottom. If the water is perfectly aerated polypterus may life for a long time without breathing air, but a specimen which had been perfectly happy in tolerably fresh water for some days, when allowed to reach the surface, succumbed in a few hours when prevented from so doing. On the other hand, one specimen lived for twenty-four hours in a landing net, with no more water than the moisture of the atmosphere, and finally had to be killed. Budgett observed the feeding of *P. senegalus* in the wild state; there was a small shoal making their way slowly along the river bank. One of their number seized a freshwater crustacean, two others gave chase and, stirring up the mud, they all disappeared. When seizing young fry or tadpoles, it proceeds stealthily after them, propelling itself by the flutters of its fan-like fins until within striking distance, and then with a sharp snap the food gulped down.

One of the authors (Khalid) observed younger specimens swimming in the neuston and hunting living insects on the surface of water. Larger polypterids come up to the surface during midday. The high catchability by means of gill net can be explained by this fact. Nevertheless, it is very difficult to catch more than one or two specimens by seining (our observations). The meat of polypterids is tasteful, especially when smoked.

Table 2. Comparison of selected plastic and meristic characters of *Polypterus senegalus* with regard to its subspecies

characters	*P.senegalus senegalus* Niger (Daget, 1954)	*P.senegalus meridionalis* Katanga (Daget, 1954)	*P.senegalus* Nile (Boulenger, 1909)	*P.senegalus* White Nile (Čihař,1970)	*P.senegalus* Gebel Aulia Lake (White Nile) the authors
In % of body length					
max body depth	11-14	11-14	10-13	10-13	12-15
head length	15-20	15-22	14-17	14-18	15-17
In % of head length					
head width	54-71	57-67	50-63	57-68	61-65
preorbital distance	17-23	17-24	17-25	11-23	22-23
eye diameter	13-20	13-24	13-20	11-15	13-15
In % of interorbital distance					
eye diameter	42-47	45-100	42-67	-	47-58
scales in lin.lat	54-58	55-58	53-61	56-59	56-58
scales in transversal series	34-36	34-36	34-40	34-37	34-37
predorsal scales	15-19	15-20	15-21	16-20	16-20
D	VIII-XI	IX-X	VIII-XI	IX-X	IX-X
A	-	-	14-17	12-14	11-14
P	-	-	-	34-37	33-37
V	-	-	-	10-11	11-12

Boulenger (1907) observed also several living specimens in an aquarium for more than a year. In an aquarium these specimens behave very peacefully towards one another. Arnoult (1966) was the first who described the spawning in captivity in the aquarium of the Ichthyological Laboratory of the National Museum in Paris. His specimens originated from the Upper Volta (Bobo-Dioulasso) and were caught in places with thick water vegetation. The natural habitat was imitated in the aquarium; for details see Arnoult (l.c.)

SUMMARY

Seven specimens (217-252 mm standard length) of *Polypterus senegalus* Cuvier, 1829, originating from Gebel Aulia reservoir (Sudan) were studied biometrically. Average values in % of standard length are as follow max. body depth 13, max. body width 12, predorsal distance 35, preventral distance 66, preanal distance 87, head length

16, head width 10, head depth 8, preorbital distance 4, postorbital distance 10, interorbital distance 4, eye diameter 2, gular bone length 9, gular bone max. width 3, caudal peduncle length 8, caudal peduncle depth 6, caudal peduncle width 4, anal fin length 5, anal fin base width 1, pectoral fin length (together with its peduncle) 13, pectoral fin length 6 (together with its peduncle) 13, pectoral fin length 6, length of 1st dorsal ray 4; D 9, A 13, P 36, V 12, linea lateralis 57 scales, scales in transversal series 36, predorsal scale rows 18; prespiracular/spiracular/postspiracular plates 3/2-3/3-4. Detailed description of one specimen (232 MM BL, 117 G) with lacking pelvic fins is given. Some own ecological notes on fish habitat are also presented.

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NOTE ON THE MORPHOMETRY OF VARICORHINUS TRUTTA (PISCES, CYPRINIFORMES) FROM IRAQ

Lubomir HANEL[1], Ota OLIVA[2], Attalah Muhaisin ALI[3]

Management of Protected Landscape Area Blanik, CS-257 06 Louňovice 8,[1], Czechoslovakia
Department of Zoology, Charles University, CS-128 44, Prague 2, Viničná 7[2], Czechoslovakia
Fisheries Research Centre, Baghdad, Iraq[3]

A b s t r a c t. The total of 24 plastic and 6 meristic characters were studied using 15 specimens of *Varicorhinus trutta* (Heckel, 1843) from the river lake Dokan north of Baghdad (Iraq). Results were compared with the scarce literature data.

MATERIAL AND METHODS

Material under study was collected in October 1981. Specimens were conserved in formalin solution and later transferred into alcohol (Photos 1, 2)*). Measurements were performed in 1990. Plastic characters were measured by dividers, the method being shown in Fig. 1. We wish to note that the standard (body) length was not measured up to the end of scalation of the body, which reaches to the base of the caudal fin and covers the origin of caudal rays, but to the posterior margin of hypurals at the middle axis of the body. The interorbital width represents the shortest distance between the orbits. The head length was measured from the tip of the snout to the posterior margin of the opercle excluding the width of the branchiostegal membrane. The head width is the maximal value found on the head at the posterior margins of opercles seen from above. Length of the barbel is the maximal length from its base to the end on its straight axis. The length of the caudal peduncle was measured on the longitudinal body axis from the vertical above the end of the anal fin base to the end of hypurals. The distance between the pectoral and ventral fins was measured from the most anterior points between insertions of both fins, similarly the distance between the ventral fin and the base of the anal fin was measured. The depths (heights) of the dorsal and anal fins are identical with the length of the longest ray of both fins. The number of scales in the lateral line was counted up to the end of the body scalation, the number of scales above the lateral line was counted obliquely ahead from the beginning of the base of the dorsal fin, the number of scales below the lateral line was counted obliquely ahead from the base of the first ventral fin ray.

RESULTS AND DISCUSSION

The genus *Varicorhinus* was established by Rüppell in 1835 (see B e r g , 1914; J o r d a n 1919), type species *Varricorhinus beso* Rüppell, 1837. This species occurs in Ethiopia (Lake Tsana, the Ethiopian rivers Blue Nile and Hawash), see B o u l e n g e r (1909). B e r g (1914) presented the review of the species known (about 25 in Africa, Asia Minor, Transcaucasia, Syria, Iran, Turkestan, the Himalaya, Southern China, India). B e r g (1914) discussed also the difference between this genus and that of *Barbus* and published the key for determination of species living inside the Russian (1914) and later the Soviet territory (1949).

Varicorhinus trutta was described as *Scaphiodon trutta* by Heckel in 1843. B e r g (1949) repeated terra typica for the first described specimens - Aleppo and Mosul. Previously, however, G ü n t h e r (1874) cited also Baghdad as a locality. B e r g (1914) used only 9 specimens with the body lenght of between 42 to 290 mm from the following localities: drainage of the Tigris (Germav), drainage of the Karun (Qualeh-

*) Photos 1 and 2 will be found at the end of this issue.

Table 1. Plastic and meristic characters at *Varicorhinus trutta* from the riverine lake Dokan (n - number of specimens, s - standard deviation, $s_{\bar{x}}$ - standard error of the mean)

	n	x	ranges	s	$s_{\bar{x}}$
total length	13	271.5	250-310	22.46	6.23
fork length	11	243.9	215-270	19.64	5.92
body length	15	228.8	205-263	17.86	4.61
weight (g)	14	172.1	126-224	49.74	13.29
scales in lin.lat.	15	79.1	74-84	3.77	0.97
- above lin lat.	15	16.2	15-18	1.01	0.26
below lin.lat.	15	11.7	10-16	1.63	0.42
gill rakers	13	27.1	23-33	2.63	0.73
D	15	III 8			
A	15	II 5			
In % of body length					
barbel length	13	2.7	2.2-3.2	0.29	0.08
orbital length	15	3.4	3.0-3.9	0.26	0.07
postorbital length	15	10.0	9.1-10.5	0.51	0.13
preorbital length	15	6.8	6.3-7.7	0.42	0.11
interorbital length	15	7.9	7.5-8.6	0.39	0.10
head length	15	19.8	18.6-20.7	0.73	0.19
head depth	15	15.1	13.3-16.4	0.88	0.23
head width	15	12.1	10.4-13.2	0.78	0.20
body depth (max.)	15	25.5	23.2-28.0	1.35	0.35
caudal peduncle					
length	15	20.4	18.6-23.6	1.31	0.34
depth	15	12.9	12.0-14.8	0.89	0.23
predorsal length	15	49.8	46.8-53.5	1.74	0,45
preventral length	15	47.6	46.1-49.5	0.94	0.24
dorsal fin base	15	13.6	12.1-15.4	1.09	0.28
dorsal fin					
height	10	23.9	21.3-25.7	1.65	0.52
anal fin height	15	14.9	12.8-17.9	1.14	0.29
anal fin base	15	5.9	5.9-7.1	0.37	0.09
pectoral fin					
length	15	16.4	15.2-17.6	0.65	0.17
ventral fin					
length	15	14.9	13.2-16.7	0,89	0.23
P-V distance	15	27.3	25.7-29.3	1.08	0.28
V-A distance	15	25.8	21.9-28.4	2.10	0.54

tul), the river Elbant (drainage of the river Tigris), Mendeli, and an uclear locality of "Rozvaliny Baksiy Mesopotamii". K a r a m a n (1969) classified this species into the genus *Capoeta* and published the keys for determination of seven species. For his study he could use only 3 specimens of *Varicorhinus trutta* from Kaskaw situated between Karmanshah-Ahraz and Karasu-Gamasia Semareh from Iran; with the third juvenile specimen only "Iran" is cited as the locality. K a r a m a n (1969) published also the

map of the distribution, and in this text Aleppo, drainage of the river Tigris, drainage of the river Kercha and some waters in southeastern Anatolia are cited as localities. He wrote that the precise distribution of this species was not known. M a h d i (1962) knew this species as "kwesa" also from the Tigris, the river Barazan (Greater Zab), Qizilja, Rawanduz (Greater Zab), Serakani (Greater Zab near Aski Kalek), Sewel (Lesser Zab). His diagnosis is taken over from G ü n t h e r (1868).

For the summary of our own results see Tab. 1, comparison with literary data is shown in Tab. 2 and 3. When we compare the literary data it is necessary to note that they are based on smaller material than ours; therefore, our aim is rather to find the variability of characters studied. However, it is certain that our collection is the largest studied up to the present. Very interesting is the difference found in the number of hard dorsal rays. We have always found three, but H e c k e l (1843) cited four, K a r a m a n (1969) three or four, Berg (1949) four or five. The dorsal has apparently thickened rays, which are serrated on the posterior margin. The number of denticles found here was 23-31, on the average 25.3, s = 2.87, s_x = 0.86. Denticles are distributed in two rows, the largest being situated near the centre of the ray length. Near the base and near the tip of the ray they are smaller and finally they disappear totally.

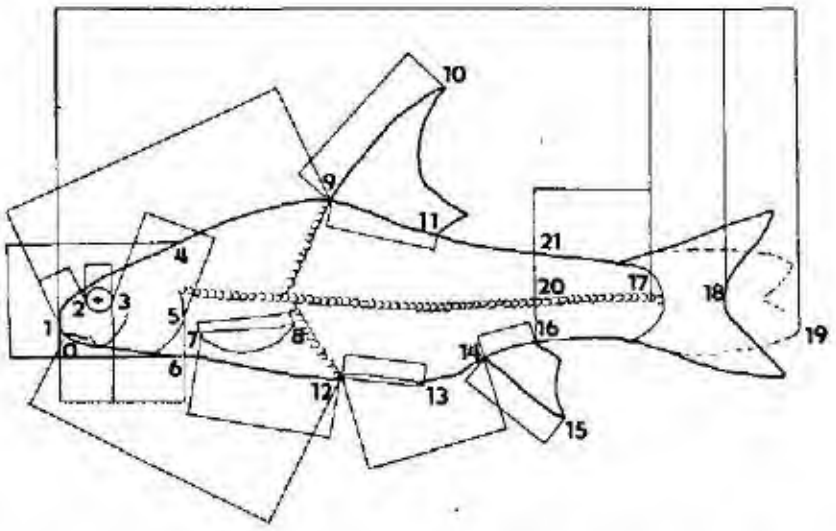

Fig. 1. The method of measurements of some plastic and meristic characters at *Varicorhinus trutta*: 1-2 preorbital distance, 2-3 eye diameter, 3-5 postorbital distance, 1-5 head length, 4-6 head depth, 1-9 predorsal distance, 0-12 preventral distance, 7-8 pectoral length, 9-11 dorsal fin length (base), 9-10 dorsal fin depth, 12-13 ventral fin length, 7-12 distance between the insertion of P and the insertion V (P-V), 12-14 distance between the insertion of V and the insertion of A (V-A), 14-16 anal fin base, 14-15 anal fin depth (height), 20-17 caudal peduncle length, 21-16 caudal peduncle depth, 1-17 body length (SL), 1-18 fork length, 1-19 total length (TL)
(the method of scale counting is evident from the figure).

Table 2 The comparison of meristic characters at *Varicorhinus trutta* by various authors (+ one specimen)

	Karaman (1969)	Heckel (1843)	Berg (1949)	own values
D	III-IV/8	IV/8	IV-V/8	III/8
A	III/5	-	III/3	II/5
scales				
in lin lat	71-76	77-82	73-67	74-84
scales above				
lin lat	-	15	16-17	15-18
scales below				
lin lat	-	12	12-15/17/	10-16
gill rakers	24+	-	-	23-33

We can also confirm observations by B e r g (1914) who found irregularly situated scales below the lateral line in two specimens. This reflected an aparent enlargement of the number of scales in this part of the body. We found ranges of 10-13 scales (14 specimens) in one specimen (SL 210 mm, W 126 g) we counted 16 scales below the lateral line. From our own material we confirmed the largest ranges of lateral line scales (74-84). Maximum differences in the plastic characters were found in the relative length of the pectoral fin (16-18, K a r a m a n, 1969: 19-21 per cent of the body length) further in the postorbital length in per cent of the head length (our own results 47-53, K a r a m a n, 1969: 54-58), in the interorbital width in per cent of the head length (our results 40-42, K a r a m a n, 1969 : 44-49).

Table 3 The comparison of plastic characters at *Varicorhinus trutta* from the riverine lake Dokan

	Karaman (1969)	Berg (1949)	own value
n	2	9	15
body length (mm)	142-320	42-290	205-263
in % of body length			
head length	21-25	22-24	19-21
predorsal distance	51	-	47-54
dorsal fin base	15-16	-	12-15
dorsal fin height	25-27	23-24	21-26
max. body depth	25-30	25-27	23-28
caudal peduncle length	20-22	-	19-24
P-V distance	28-29	-	26-29
pecteral fin length	19-21	-	16-18
anal fin height	17	-	13-18
in % of P-V distance			
pectoral length	63-69	-	55-65
in % of head length			
preorbital distance	30-34	-	32-37
postorbital distance	54-58	-	47-53
eye diameter	16-21	-	16-19
interorbital length	44-49	-	40-42
barbel length	9-18	-	11-19

SUMMARY

Plastic and meristic characters of *Varicorhinus trutta* (Heckel, 1843) originating from Lake Dokan in Iraq are evaluated and the redescription is made as follows : D III 8, A II 5, l.lat. 74-84, above lateral line 15-18, below 10-16 scales. Branchial spines on the first branchial arch 23-33, number of denticles on thickened osseous dorsal ray 23-31. In % of the body length : eye diameter 3.0-3.9, postorbital length 9.1-10.5, preorbital length 6.3-7.7, interorbital length 7.5-8.6, barbel length 2.2-3.2, head length 19-21, head depth 13-16, head width 10-13, body depth 23-28, caudal peduncle length 19-24, caudal peduncle depth 12-15, predorsal distance 47-54, dorsal fin length (base) 12-15, dorsal fin depth (height) 21-26, anal fin length 6-7, anal fin depth 13-18, pectoral fin length 15-18, ventral fin length 13-17, P-V distance 26-29, V-A distance 22-28. Difference found between our own and the literary data can be explained by the geographic variability of the material, but for the elucidation of this problem larger samples from the whole territory inhabited by this species would be necessary.

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BOOK REVIEW

Banarescu P.: *Zoogeography of Fresh Waters. Vol. 2. Distribution and Dispersal of Freshwaters Animals in North America and Eurasia.* Wiesbaden: Aula - Verlag, 1992, Vol. 2, pp. 519 - 1091, Price DM 150.

This book is the second one of the above mentioned series, it is dedicated to the memory of the great zoogeographers of the past (Léon Croizat, Phillip J. Darlington, Charles Darwin, Sven Ekman, Hermann von Ihering, René Jeannel, Gustaf de Lattin, W. C. Matthew, George S. Myers, Ludwig Schmarda, August Thienemann and Alfred Rustel Wallace). In contents the chapter 9, dealing with introduction to regional freshwater zoogeography and embracing the Holarctic region, chapter 10 dealing chiefly and only with North America, chapter 11, dealing with the Euro - Mediterranean subregion, chapter 12 with Siberia and adjacent areas, chapter 13 with the Sino - Indian region. The East Asian subregion is described in the chapter 14, the High Asian subregion in the chapter 15, the South Asian subregion in the chapter 16, the Western Asian intermediary area in the chapter 17. Each chapter has its own numeration of figures and maps. Similarly as in the Volume 1 the author demonstrated his world-wide reputation and his broad knowledge in this field. Maps showing the distribution of European fresh water fishes are excellent. Czech and Slovak authors will be pleasured to see their results are mentioned here, e.g. Pivnička & Hensel's (1978) studies on the grayling. *Thymallus thymallus;* Holčík's (1986) studies on lampreys of the genus *Eudontomyzon*, fossil records of several European cyprinids (Obrhelová, 1969, 1970 and 1971); percichthyids or serranids (formerly presumed as percids) described also by Obrhelová (1971); Holčík & Pivnička's (1968) remarks on *Cottus szanaga*, closely related to the European *C. poecilopus*. Similar care comparable with this shown in fishes, Prof. Banarescu demonstrated to another groups of water animals from turberlarians upto water insects and crustaceans. This volume, similarly as the first one, is a manual of a great interest an value for all zoologists, paleontologists and geographers. Again, to the author should be congratulated to such work.

O Oliva

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NEW DATA ON THE DISTRIBUTION AND LIFE HABITS OF CUBAN BIRDS

Jiří MLÍKOVSKÝ

Department of Evolutionary Biology, Czechoslovak Academy of Sciences, Sekaninova 28, CS-128 00 Praha 2, Czechoslovakia

A b s t r a c t. Birds were observed in 15 localities of Cuba in March 1984 and March/April 1989. Together, 95 species belonging in 41 families were observed. Details on the distribution and life habits are given. First probable breeding of *Seiurus noveboracensis* outside of North America was recorded.

INTRODUCTION

In spite of the long history of Cuban ornithology (G a r r i d o & G a r c i a M o n t a n a, 1975), the birds of Cuba belong currently to the least known of the Caribbean islands (B o n d, 1979). The distribution and phenology of occurrence of Cuban birds have been described only in general terms so far (B a r b o u r, 1923; G a r r i d o & G a r c i a M o n t a n a, 1975). Data on the breeding habits of Cuban birds were recently summarized by B a l á t & G o n z á l e z (1982) and V a l d e s M i r o (1984), but adequate information is available for a few species only, such as *Mimus polyglottos* or *Zenaida macroura* (B a l á t & P o z a c, 1981). Hence, even anecdotical data on the birds of Cuba obtained by visiting ornithologists are of interest (e.g., B o n d, 1950; R i p l e y & W a t s o n, 1956; V a u r i e, 1957; D a t h e, 1967; D a t h e & P i s c h e r, 1969, 1979, 1981; S a n t o s & T a r a š č u k, 1981; B u d e n & O l s o n, 1989). In the present paper I describe ornithology observations obtained during my visits to Cuba in 1984 and 1989.

MATERIAL AND METHODS

During two trips to Cuba (4-18 March 1984, 27 March - 12 April 1989) I visited 15 ornithological localities and occasionally made bird notes in several other places in 7 of the 12 Cuban provinces (Pinar del Rio, Habana, Matanzas, Cienfuego, Villa Clara, Sancti Spiritus and Ciego de Avilla: see Fig. 1). The localities are listed and briefly characterized below. Birds were identified with the help of field guides by R o b b i n s et al. (1966), B o n d (1979) and S c o t t (1983). Ornithological nomenclature follows G a r r i d o & G a r c i a M o n t a n a (1975). In 1984, birds were only observed, in 1989 they were also mistnetted in two localities (Soroá and Caibarien)

(1) V i n a l e s Pinar del Rio Province (1 April 1989) In mountains, characterized by narrow deep valleys between isolated hills and hill chains covered by tropical forest. Most of the observations were made in the close vicinity of Rancho San Vicente, north of the City of Vinales.

(2) S o r o á . Pinar del Rio Province (31 March 1989, 2-3 April 1989) Tropical forest.

(3) City of L a H a b a n a, La Habana Province (4-5 March 1984, 30 March 1989): Intravillan with parks rich in trees.

(4) H a b a n a - B a c u r a n a o, La Habana Province (28-29 March 1989): Suburb near shore; dry, macchia-like biotopes.

(5) Habana-Guánabo, La Habana Province (4-5 March 1984): Suburb, garden-city near shore at Playa Hermosa.

(6) Jibanao, Matanzas Province (4-5 April 1989): Forest - covered hills near sea.

(7) Varadero, Matanzas Province (16 March 1984): Sea shore, partly covered by sand, partly by stone blocks.

(8) Laguna del Tesoro, Matanzas Province (6-7 March 1984): Salt-water lake, skirted by *Cortaderia* reed thickets.

(9) Playa Larga, Matanzas Province (6-8 March 1984): Lowland tropical forest at the eastern border of the Zapata swamps.

(10) Topaz de Collantes, Cienfuegos Province (8-9 and 11 March 1984): In Escambray Mountains, approximately 900 m a.s.l. Hill sides are covered with tropical forest, but above approximately 800 m a.s.l. they are replaced by *Pinus caribeus* monocultures.

(11) Playa Ancón, Sancti Spiritus Province (10 March 1984): Sea shore with remains of mangroves.

(12) Caibarien, Villa Clara Province (6-8 April 1989): Near-shore lakes near villa Blanca, partly covered by remains of dying mangroves at Villa Blanca.

(13) Boquerón, Sancti Spiritus Province (13 March 1984): Hills covered with tropical forest in the eastern part of Alturas del Nordeste Mountains.

(14) Morón, Ciego de Avilla Province (12 March 1984): Intravillan.

(15) La Tinaja, Ciego de Avila Province (14 March 1984): Near-shore shallow lakes, partly covered with mangroves.

Breeding records are classified accordings to the clue by the European Ornithological Atlas Committee (Sharrock, 1974). The sequence of species and names used follow Garrido & Garcia Montana (1975). Data are mostly omitted in the following text because they can be found in the "Localities" section.

Fig. 1. Ornithological localities in Cuba, visited during March 1984 and March/April 1989. 1 - Vinales, 2 - Soroa, 3 - City of La Habana, 4 - Habana-Bucuranao, 5 - Habana-Guánabo, 6 - Jibanao, 7 - Varadero, 8 - Laguna del Tesoro, 9 - Playa Larga, 10 - Topez de Collantes, 11 - Playa Ancón, 12 - Caibarien, 13 - Boquerón, 14 - Moron, 15 - La Tinaja.

Podicipedidae

Least Grebe *Podiceps dominicus* (Linnaeus): Laguna del Tesoro.

Pied-billed Grebe *Podilymbus podiceps* (Linnaeus): Vinales.

Pelecanidae

Brown Pelican *Pelecanus occidentalis* Linnaeus: Playa Larga, Varadero.

Phalacrocoracidae

Double-crested Cormorant *Phalacrocorax auritus* (Lesson): Playa Ancón.

Olivaceous Cormorant *Phalacrocorax olivaceus* (Humboldt): Caibarien (1 carcass found at shore).

Anhingidae:

Anhinga *Anhinga anhinga* (Linnaeus): Laguna del Tesoro.

Fregatidae

Man-o'-War Bird *Fregatta magnificens* (Mathews): Playa Ancón, Caibarien.

Ardeidae

Great Blue Heron *Ardea herodias* (Linnaeus): Laguna del Tesoro, Playa Ancón.

Common Egret *Egretta alba* (Gmelin): La Tinaja.

Little Blue Heron *Florida caerulea* (Linnaeus): La Tinaja.

Louisiana Heron *Hydranassa tricolor* (Mueller): La Tinaja.

Cattle Egret *Ardeola ibis* (Linnaeus): Abundant at all localities, except La Habana-City.

Green Heron *Butorides virescens* (Linnaeus): Laguna del Tesoro, Playa Ancón, Topez de Collantes. La Habana-city (1984, 1989), Habana-Bacuranao, Soroá, Caibarien.

Least Bittern *Ixobrychus exilis* (Gmelin): Caibarien.

Threskiornithidae:

White Ibis *Eudocimus albus* (Linnaeus): La Tinaja.

Roseate Spoonbill *Ajaia ajaja* (Linnaeus): La Tinaja.

Phoenicopteridae:

Flamingo *Phoenicopterus ruber* Linnaeus: La Tinaja (small flock of adult and immature individuals).

Anseridae:

Mallard *Anas platyrhynchos* (Linnaeus): Laguna del Tesoro.

Wood Duck *Aix sponsa* (Linnaeus): Soroá (B-1). According to Garrido & Garcia Montana (1975), *Aix sponsa* inhabits only lagoons in Cuba. In Soroá, I observed a pair on a creek surrounded by tropical forest. This is roughly in accordance with habitat requirements of this bird in other parts of its area, although more slowly running water is usually preferred (Johnsgard, 1975; Bellrose, 1981).

Red-breasted Merganser *Mergus serrator* Linnaeus: Jibanao. A female was observed on the sea near shore at Jibanao-El Abra on 4 April 1989. Garrido & Garcia Montana

(1975) listed only two records of this species in Cuba (20 November and 18 December; years not given). This is thus probably the first spring record of *Mergus serrator* in Cuba.

Cathartidae:

Turkey Vulture *Cathartres aura* (Linnaeus): Abundant at all localities. An individual was observed entering a rock cavity located approximately 80 m above ground in the cliff with "prehistorical paintings" near Vinales on 1 April 1989. This may indicate breeding (D-13). A flock of 120 individuals was observed near Rancho San Vicente on the same day.

Accipitridae:

Red-tailed Hawk *Buteo jamaicensis* (Gmelin): Jibanao.

Broad-winged Hawk *Buteo platypterus* (Vieillot): Playa Larga, Boquerón.

Falconidae:

Pigeon Hawk *Falco columbarius* Linnaeus: Habana-Bacuranao (rather abundant).

Sparrow Hawk *Falco sparverius* Linnaeus: Topez de Collantes, Soroá, Vinales. Also along the road between Australia and Playa Larga on 6 March 1984.

Rallidae:

Purple Gallinule *Porphyrula martinica* (Linnaeus): Laguna del Tesoro

Florida Gallinule *Gallinula chloropus* (Linnaeus): Laguna del Tesoro, Caibarien.

American Coot *Fulica americana* Gmelin: Laguna del Tesoro.

Jacanidae:

American Jacana *Jacana spinosa* (Linnaeus): Laguna del Tesoro.

Charadriidae:

Thick-billed Plover *Charadrius wilsonia* Ord: Caibarien.

Killdeer *Charadrius vociferus* Linnaeus: Playa Larga, Playa Ancón, Bocquerón, Habana-Bacuranao. Distraction behavior was observed in Habana-Bacuranao on 29 March 1989 (L. Hovorka, pers. communication). This indicates the presence of flightless young, or at least nest with eggs (D-10). Baláth & González (1982) knew complete clutches of this species only since the 3rd decade of April. Gundlach (1875), however, stated that nesting starts already in March, which is more in accordance with the data presented here.

Ruddy Turnstone *Arenaria interpres* (Linnaeus): La Tinaja.

Recurvirostridae:

Stilt *Himantopus himantopus* (Linnaeus): La Tinaja, Caibarien.

Scolopacidae:

Lesser Yellow-leg *Tringa flavipes* (Gmelin): La Tinaja, Caibarien.

Willet *Catoptrophorus semipalmatus* (Gmelin): Playa Anceón, La Tinaja, Varadero.

Short-billed Dowitcher *Limnodromus griseus* (Gmelin): La Tinaja.

Semipalmated Sandpiper *Calidris pusilla* (Linnaeus): La Tinaja.

Laridae:

Herring Gull *Larus argentatus* Pontoppidan: A single immature individual was observed at La Tinaja on 14 March 1984. According to Garrido & Garcia Montana (1975) this species is regularly encountered only outside of this area, in the provinces of Habana and Matanzas.

Ring-billed Gull *Larus delawarensis* Ord: Several individuals were seen at La Tinaja on 14 March 1984. According to Garrido & Garcia Montana (1975), *Larus delawarensis* is a rare visitor to Cuba.

Laughing Gull *Larus atricilla* Linnaeus: La Tinaja, Caibarien.

Royal Tern *Thalasseus maximus* (Boddaert): La Tinaja.

Caspian Tern *Hydroprogne caspia* (Pallas): A single individual was seen at La Tinaja on 14 March 1984. The species has been recorded only twice in Cuba so far (25 December and 3 June, years not given) according to Garrido & Garcia Montana (1975).

Rynchopidae:

Black Skimmer *Rynchops nigra* Linnaeus: La Tinaja.

Columbidae:

Mourning Dove *Zenaida macroura* (Linnaeus): Rather common at al localities, except Varadero. On the 30 March 1989 I located two nests in La Habana-City. In one of them, placed approximately 14 m above ground on a *Magnolia* tree, an incubating individual was seen (D-13). The other nest was being constructed approximately 10 m above ground on *Reystonea regia* palmtree (C-9). Both nests were higher that those recorded by Balát & Pozas (1981).

White-winged Dove *Zenaida asiatica* (Linnaeus): Topez de Collantes. Also along the road between Cienfuegos and Trinidad.

Ground Dove *Columbigallina passerina* (Linnaeus): Habana-Bacuranao, Playa Larga, Bocquerón, La Tinaja, Soroá and Caibarien. A female mistnetted on 3 April 1989 in Soroá laid an egg before being released (D-14).

Psittacidae:

Cuban Parakeet *Aratinga euops* (Wagler): Topez de Collantes.

Cuculidae:

Cuban Lizard Cuckoo *Saurothera merlini* d'Orbigny: Playa Larga.

Smooth-billed Ani *Crotophaga ani* Linnaeus: Common at all localities, except La Habana-City.

Strigidae:

Cuban Pygmy Owl *Glaucidium siu* (d'Orbigny): Playa Larga.

Trochilidae:

Cuban Emerald *Chlorostilbon ricordii* (Gervais): Habana-Guánabo, Playa Larga, Topez de Collantes, Playa Ancón, Soroá, Vinales and Jibanao.

Trogonidae:

Cuban Trogon *Priotelus temnurus* (Temninck): Soroá, Vinales, Jibanao. Gundlach (1893), Todd (1916) and Balát & González (1982) mentioned that this species breeds very late in the year, only after woodpeckers leave their breeding holes, which are then used by trogons. However, males of *Priotelus temnurus* were frequently singing already in the late March and early April 1989 in Soroá and Vinales (B-2).

Alcedinidae:

Belted Kingfisher *Ceryle alcyon* (Linnaeus): Playa Ancón, La Tinaja, Soroá.

Todidae:

Cuban Todi *Todus multicolor* Gould: Topez de Collantes, Bocquetón, Jibanao.

Picidae:

Yellow-shafted Flicker *Colaptes auratus* (Linnaeus): Playa Larga.

Fernandina's Flicker *Colaptes fernandinae* Vigors: Soroá. This woodpecker runs on ground, instead of hopping as do other picids.

West Indian Red-bellied Woodpecker *Centurus superciliaris* (Temninck): Playa Larga. Topez de Collantes, Soroá, Vinales. Singing males were frequently heard in Vinales (B-2), and a frequently visited nest-hole was found in Soroá (D-13). It was located approximately 8 m above ground in a thick side branch of an unidentified angiosperm tree. The entrance hole was oriented toward the ground.

Sapsucker *Sphyrapicus varius* (Linnaeus): Topez de Collantes, Habana-Bacuranao.

Cuban Green Woodpecker *Xiphidiopicus percussus* (Temninck): Soroá, Vinales, Jibanao. A breading hole was found in Soroá, approximately 6 m above ground in a side branch of an unidentified angiosperm tree in Soroá (D-13). The entrance hole was oriented toward ground. As I have never observed this woodpecker pecking, the possibility should be considered that the observed nesting hole was pecked by *Centurus superciliaris* and subsequently occupied by *Xiphidiopicus percussus*. Two individuals (probably mates) alternated in the breeding hole in intervals of several hours. This might indicate that they incubated eggs or very small nestlings and that both sexes participate in this activity. While searching for food, none of the observed individuals pecked for it. They most often examined for food tufts of epiphytes, occassionaly scanning also tree bark.

Tyrannidae:

Gray Kingbird *Tyrannus dominicensis* (Gmelin): Soroá, Vinales. Both females mistnetted at Soroá on 2-3 April 1989 had large brood patch (C-8) which indicates earlier breeding than known to Balát & Gonzáles (1982). Pairing flights were observed in Vinales on 1 April 1989 (C-5).

Loggerhead Flycatcher *Tyrannus caudifasciatus* d'Orbigny: Soroá, Vinales. A nest of this species with two half-grown neestlings was found approximately 3 m above ground on a thin side-branch of an unidentified angiosperm tree in Soroá on 2 April

1989 (D-16). This indicates an erlier breeding date than known to Balát & González (1982). Both parents were observed to feed the young.

Greater Antillean Pewee *Contopus caribaeus* (d'Orbigny) : Soroá, Vinales. Singing males were recorded at Soroá, and a female with large brood patch was mistnetted there on 2 April 1989 (C-8). This agrees with the breeding period given for this species in the Isla de la Juventud (Walkinshaw & Baker 1946). But indicates earlier start of its breeding season in the Island of Cuba than recorded by Balát & González (1982).

Hirundinidae:

Cuban Purple Martin *Progne dominicensis* (Gmelin): La Habana-City (1984, 1989).

Cave Swallow *Petrochelidon fulva* ((Vieillot): Habana - Bacurano.

Corvidae:

Cuban Crow *Coryvus nasicus* Temminck: Playa Larga. Here, two individuals were observed to build nest in the fonds of an unidentified palmtree, approximately 7-8 m above ground on 7-8 March 1984 (C-9). This indicates an earlier breeding date than recorded by Gundlach (1983) or Todd (1916).

Mimidae:

Northern Mockingbird *Mimus polyglottos* (Linnaeus): Recorded at all localities, except Laguna del Tesoro and Playa Larga. Males were everywhere Singing in 1984, but they sang only in Soroá and Vinales in 1989 (B-2).

Catbird *Dumetella carolinensis* (Linnaeus): Playa Larga, Vinales.

Turdidae:

Red-legged Thrush *Mimocichla plumbea* (Linnaeus): Topez de Collantes, Soroá, Vinales, Jibacoa. Males of this species were frequently singing in Soroá and Vinales (B-2) and all the three females mistnetted in Soroá on 2-3 April 1989 had large brood patches (C-8). On both these days, adults were observed to bring food to the young, but nests were not located (D-14).

Sylviidae:

Blue-gray Gnatcatcher *Polioptila caerulea* (Linnaeus): Habana-Guánabo.

Vireonidae:

Cuban Vireo *Vireo gundlachii* Lembeye: Topez de Collantes, Playa Ancón.

Black-whiskered Vireo *Vireo altiloquus* Vieillot: Soroá, Vinales, Caibarien. Males of this species were frequently singing in Soroá and Vinales (B-2). A female mistnetted in Soroá on 3 April 1989 had a large brood patch (C-8). This indicates an earlier breeding date than recorded before (Balát & González, 1982).

Parulidae:

Black and White Warbler *Mniotilta varia* (Linnaeus): Playa Larga, Habana-Bacuranao.

Worm-eating Warbler *Helmitheros vermivorus* (Gmelin): Caibarien.

Tennessee Warbler *Vermivora peregrina* (Wilson): Habana-Guánabo. Playa Larga.

Yellow Warbler *Dendroica petechia* (Linnaeus): Playa Ancón, Caibarien.

Magnolia Warbler *Dendroica magnolia* (Wilson): Playa Larga.

Cape-May Warbler *Dendroica tigrina* (Gmelin): Habana-Guánabo, Topez de Collantes.

Black-throated Blue Warbler *Dendroica caerulescens* (Gmelin): Playa Larga, Topez de Collantes.

Black-poll Warbler *Dendroica striata* (Forster): Playa Larga, Caibarien.

Prairie Warbler *Dendroica discolor* (Vieillot): Playa Ancón, Caibarien.

Palm Warbler *Dendroica palmarum* (Gmelin): Habana-Guánabo, Habana-Bacuranao, Caibarien.

Northern Water-Thrush *Seiurus noveboracensis* (Gmelin): Soroá, Caibarien. Among 29 individuals of this species mistnetted at Caibarien on 6-7 April 1989 there was one female with a large brood patch (C-8). Since this is a good indicator of incubating activity (T h i e d e, 1985), this find represents the first breeding record of this species in Cuba or elsewhere in the Caribbean area. *Seiurus noveboracensis* normally breeds in Canada and the northern USA (S c o t t, 1983), while the Caribbean islands belong to its winter area.

Common Yellow-throat *Geothlypis trichas* (Linnaeus): Playa Larga, La Tinaja, Habana-Bacuranao, Soroá.

Yellow-headed Warbler *Teretistris fernandinae* (Lembeye): Soroá.

Oriente Warbler *Teretistris fornsi* Gundlach: Playa Larga (common). According to G a r r i d o & G a r c i a M o n t a n a (1975), this is an eastern vicariant of *Teretistris fernandinae*. The record from Playa Larga is far west from the range registered before, but is well in accordance with the spreading trend of *Teretistris fornsi* mentioned by G a r r i d o & G a r c i a M o n t a n a (1975).

Redstart *Setophaga ruticilla* (Linnaeus): Playa Larga, Caibarien.

C o e r e b i d a e:

Red-legged Honey-creeper *Cyanerpes cyaneus* (Linnaeus): Vinales.

T h r a u p i d a e:

Striped-headed Tanager *Spindalis zena* (Linnaeus): Topez de Collantes (C-3), Sorroá (B-2).

I c t e r i d a e:

Greater Antillean Grackle *Quiscalus niger* (Cassin): Common at all localities. A breeding colony was found in Soroá in a group of unidentified angiosperm trees (B-2, C-3, C-5, C-7, C-8, C-9, D-13). Nests were placed in tufts of epiphytes, approximately 7-15 m above ground.

Cuban Oriole *Icterus dominicensis* (Linnaeus): Laguna del Tesoro, Playa Larga, Habana-Bacuranao, Soroá.

Baltimore Oriole *Icterus galbula* (Linnaeus): Playa Larga.

Meadowlark *Sturnella magna* (Linnaeus): Playa Larga.

F r i n g i l l i d a e :

Yellow-faced Grassquit *Tiaris olivacea* (Linnaeus): Playa Larga, Vinales, Soroá, Jibacoa. Singing males were observed in Vinales on 1 April 1989 (B-2).

Cuban Grassquit *Tiaris canora* (Gmelin): Boquerón.

Cuban Bullfinch *Melopyrrha nigra* (Linnaeus): Playa Larga. Topez de Collantes, Boquerón, Soroá.

P l o c e i d a e:

House Sparrow *Passer domesticus* (Linnaeus): Common in most human settlings visited. In 1989, signs of breeding activity (B-2 to D-13) were observed at all localities.

A c k n o w l e d g e m e n t

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ÜBER DIE PUPPEN DER MITTELEUROPÄISCHEN GRACILLARIINAE (LEPIDOPTERA, GRACILLARIIDAE)

Jan PATOČKA

Institut für Forstökologie der SAW, Štúrova 2, CS 960 53 Zvolen, Tschechoslovakei

A b s t r a c t. The pupae of accessible Central European Gracillariinae are characterized, described and pictured. A key for determining the species as well as some biological data are added. The present system of this group is discussed from the point of view of pupal characters.

Die vorliegende Arbeit knüpft an die von P a t o č k a (im Druck) sowie P a t o č k a & B u s z k o (in Vorbereitung) an. Über die Morphologie der hier erwähnten Taxa gab es bisher wenig Arbeiten. In P a t o č k a (1980) gibt es eine Bestimmungstabelle der an Eichen vorkommenden mitteleuropäischen Arten. Mehrere nordamerikanische Taxa werden in M o s h e r (1916) charakterisiert. Die Kenntnis der Puppen soll in dieser noch nicht einwandfrei geklärten Gruppe zu deren Taxonomie und zur Lösung weiterer theoretischer und praktischer Fragen beitragen.

Das System und die Nomenklatur folgen L e r a u t (1980), G u s t a v s s o n et al. (1987) und nehmen auch K u z n e t z o v (1979) in Betracht. Die puppenmorphologische Terminologie wird in P a t o č k a (im Druck) näher erläutert und dargestellt, sie basiert im wesentlichen auf M o s h e r (1916). Die Angaben über die Bionomie folgen vor allem H e r i n g (1957), P a t z a k (1986) und S c h ü t z e (1931) bzw. stammen von eigenen Untersuchungen.

MATERIAL UND METHODIK

Das untersuchte Material stammt hauptsächlich von der Puppensammlung des Verfassers. Für die Überlassung des weiteren dankt er ferner vor allem den Herren Dr. J. Buszko (Toruń, Polen), Dr. F. Gregor (Brno), O. Karsholt (Kopenhagen), A. Laštůvka (Prostějov, ČSFR), Prof. Dr. J. Schönherr (Freiburg i. Br., Deutschland), Ing. J. Skyva (Prag) verbindlichst. Für die mannigfaltige Unterstützung dankt er J. Okáli (Bratislava).

Die Methodik entspricht der bei den übrigen Arbeiten des Verfassers über die Schmetterlingspuppen (z.B. P a t o č k a, 1990).

Unterfamilie GRACILLARIINAE

Pupae semiliberae, mittelgross bis klein, schlank (Abb. 129, 153), meist bräunlich, seltener schwärzlich gefärbt und mehr oder weniger weichhäutig. Körper meist ± fein

skulpturiert, dorsal am 2.-8. Abdominalsegment jedoch mit Dörnchen besetz, diese ziemlich gross bis winzig (Abb. 73, 43). Seltener gibt es eine Dörnchengruppe auch am 9. Abdominalsegment (Abb. 73). Am 10. Segment befinden sich 3-5 Paare grösserer Einzeldörnchen (Abb. 107, 150), ausnahmsweise fehlen diese (Abb. 30), oder es gibt anstatt ihnen ein Paar von Ausläufern (Abb. 153). Borsten meist gross, manchmal auch klein, am Pronotum und am 10. Abdominalsegment fehlen sie immer (Abb. 29, 37). Starke Frontalborsten sind vorhanden (Abb. 1), oder fehlen sie (Abb. 13), 2 Paare von Clypealborsten sind meist sichtbar, ± klein. Frontalfortsatz vorhanden, spitz (Abb. 21, 63), zuweilen stumpf (Abb. 24, 34, 131), in einigen Fällen auch fehlend, dann Frons abgerundet (Abb. 2, 156). Für diese Unterfamilie sind die langen Antennae charakteristisch, ± so lang wie der Körper (Abb. 153), oder noch länger (Abb. 129). Clypeogenale Sutur scharf, Clypeus gross, ± kielförmig, frontoclypeale Sutur nicht sichtbar, Postclypeus kaum differenziert. Labrum relativ gross, ± halbkreisförmig abgerundet (Abb. I, 62), selten konkav (Abb. 27). Mandibulae auch gross, länglich, am Ende abgerundet. Labium mit den Palpi labiales relativ lang, aber deutlich kürzer als die Proboscis (Abb. 129, 153), diese auch relativ lang, kürzer (Abb. 153), ± so lang (Abb. 165), oder länger (Abb. 129, 141) als die Vorder-, kürzer als die Mittelbeine. Maxillae (Proboscis) mit einem Einschnitt, wo die Vorderschenkel liegen, diese meist ± länger (Abb. 129), zuweilen so lang, oder kürzer (Abb. 153) als die Palpi labiales mit Labium, immer kürzer als die Proboscis. Palpi maxillares nur bei wenigen Gattungen (*Caloptilia, Gracillaria*) sichtbar als kleiner Dreieck vor der Basis der Mittelbeine (Abb. 1, 2). Mittelbeine deutlich länger als die Vorderbeine und Proboscis, von den langen, sichtbaren Kaudalteilen der Hinterbeine weit überragt, die jedoch fast immer kürzer als die Antennae sind (Abb. 129, 153). Vertex breit, in Dorsalsicht meist ± gleichlang oder etwas kürzer selten viel länger (Abb. 155) als Frons und deutlich länger als Pronotum (Abb. 3, 64, 147). Dieses im Mittelteil relativ wenig (Abb. 3) bis stark verkürzt (verschmälert, Abb. 35, 147), sogar (bei *Spulerina*) unterbrochen (Abb. 155). Meso- und Metanotum ohne Grübchengebilde, welche so oft bei Lithocolletinae varkommen. Metanotum gross, frontomedial mitteltief, ± abgerundet oder spitz ausgeschnitten (Abb. 36, 56), frontolaterale Ausläufer abgerundet (Abb. 8, 12), oder mehr spitz (Abb. 56, 142) mit starker Subdorsalborste in der Mitte. Hinterflügel wenigstens bis zum 2. Abdominalsegment sichtbar (bei Lithocolletinae nur an der Basis, sonst verdeckt). Zwischen den Abdominalsegmenten im Suprastigmatalgebiet gibt es meist keine tieferen Senkungen, Ausläufer, oder andere Gebilde, die bei Lithocolletinae oft vorkommen. 10. Abdominalsegment am Ende stumpf abgerundet, an der Analnaht zuweilen sogar konkav (Abb. 153, 6), manchmal auch ± kegelförmig vorgezogen (Abb. 71), jedoch immer ohne einen Kremaster. Analfeld und Genitalfeld beim ♂ (Abb. 71, 86, 39) oft vorhanden. Die drei letzten Abdominalsegmente (zum Unterschied von der Unterfamilie Phyllocnistinae) immer mit deutlichen Grenzen untereinander (Abb. 59).

Die Vertreter der Unterfamilie Gracillariinae leben an Gehölzern oder Krautpflanzen von mehreren Familien der Dicotyledonae und legen die Eier an die Oberfläche der Pflanze. Die Raupen minieren oft anfangs nur in der Blattepidermis, dann zeitweise, oder bis zur Verpuppung in dem Mesophyll der Blätter, in einem Falle *(Spulerina)* zwischen der Korkschicht und dem grünen Parenchym der jungen Rinde. Bei mehreren Arten werden die Minen innen ausgesponnen (Blasenminen) bzw. eine der Minenhäute dadurch gefaltet (Faltenminen). Viele leben jedoch später nicht mehr minierend, nur die Epidermis und das Mesophyll verzehrend in einer Blattrolle, einem Blattkegel oder unter einem umgeschlagenen Blattrand. Der Kot wird manchmal von der Mine beseitigt; in den Gehäusen der Raupen wird der charakteristische schwarze Kot oft zu einem Klumpen zusammengesponnen. Bei den in der Blattepidermis minierenden Jungraupen und bei *Spulerina* lebenslang bleibt der Kot flüssig. Die Verpuppung findet im Gehäuse der Raupe (meist in einem Kokon) oder auch ausserhalb desselben in einem flachen pergamentartigen Gehäuse aus Gespinst und Sekret der Raupe z. B. unter einem speziellen kleinen Blattumschlag, an der Blattspreite, Rinde usw. statt. Bei *Spulerina* findet sich das Kokon im Innern am Ende der Raupenmine. Bei dieser Art überwintert die Raupe, bei einigen weiteren Arten die erwachsene Raupe als Praepupa, bei den meisten jedoch die Puppe oder die Imago. Die Arten sind oft bi-, zuweilen sogar trivoltin. Sie bewohnen die Wälder (oft deren Randzone), Waldsteppe, buschige Lehnen, zuweilen auch freies Gelände, Wiesen, Felder, Ruderalzonen. Als Schädlinge der Wälder und Kulturpflanzen kommen sie nur in beschränktem Masse in Betracht, sie wirken jedoch trotz ihrer Kleinheit recht ästhetisch und manche sind seltene Bewohner der schnell verschwindenden Biotope, die einen Schutz verdienen.

Die Bestimmungstabelle der Gattungen wird in P a t o č k a (im Druck) erwähnt. Es fehlt dort die Gattung *Aspilapteryx*, bei deren Bestimmung man zum Punkt 5 der Tabelle gelangt. Von *Gracillaria* unterscheidet sich *Aspilapteryx* durch das Fehlen der Frontalborste (Abbb. 13, 14) und von *Calybites (phasianipennella)* durch den von Leisten ventral am 7. und Anwesenheit der Einzeldörnchen am 10. Abdominalsegment (Abb. 18).

Gattung CALOPTILIA Hübner, 1825

Relativ grössere Puppen, Kopf in Ventralsicht vorne breit abgerundet, in Lateralsicht mit ventral orientiertem Frontalfortsatz. Palpi maxillares sichtbar. Metanotum im Mittelteil nur mässig verkürzt, meist mit charakteristischen Gebilden. Dörnchen am Abdomen grob bis mittelfein.

Die Raupen leben vorwiegend an Gehölzern, minieren nur jung, später halten sich in einer Blattrolle oder Blattüte auf, verpuppen sich in einem flachen Kokon meist an der Blattunterseite. Es überwintert die Imago, seltener die Puppe. Die Mehrzahl der Arten

bewohnt die Randzone der Waldbestände und Baumgruppen. Diese Gattung wird in P a t o č k a & B u s z k o (in Vorbereitung) bearbeitet.

Gatttung GRACILLARIA Haworth, 1828

Kopf in Ventralsicht breit abgerundet ohne Frontalfortsatz. Frontalborste gross (Abb. 1-3). Pronotum in der Mitte nur mässig verkürzt (Abb. 3). 2.-8. Abdominalsegment mit starken, fast gleichgrossen Dörnchen (Abb. 4, 5). 8. Abdominalsegment ventral ohne Leistengebilden. 10. Segment am Ende mit 4 Paaren starker Dörnchen (Abb. 4-6).

Raupe lebt an Gehölzern aus der Familie Oleaceae, meist gruppenweise in grossen Blattminen, später, nicht mehr minierend, in einer Blattrolle. Verpuppung in weisslichem Kokon, die Puppe überwintert. In Mitteleuropa nur eine Art.

Gracillaria syringella (Fabricius, 1794)

Puppe 6-7,5 x 0,9-1,5 mm (3 ♂, 2 ♀ aus der Slowakei) trüb hellbraun, Rücken dunkler, Exuvie weichhäutig, mässig glänzend. 9. und 10. Abdominalsegment an der Dorsalseite rauh. 2.-7. Segment dorsal mit relativ grossen (schon bei 15 x Vergrösserung sichtbaren) ± gleichgrossen (nur am Frontalrand des Segmentes verkleinerten) Dörnchen, am Kaudalrand der Segmente ein schmales dornloses Band, 8. Segment nur in der Basalhälfte bedornt (Abb. 4, 5). Borsten, u. a. auch die Frontalborste, stark, Clypealborsten ebenfalls deutlich. Frons stumpf abgerundet (Abb. 1-3). Vertex relativ stumpfwinklig und kurz (Abb. 3), Frontoclypealsutur oberhalb des Labrums stärker gebogen, Labium bis zur Basis scharf abgegrenzt, Palpi maxillares sichtbar (Abb. 1). Pronotum im Mittelteil ganz schwach verkürzt, relativ wenig skulpturiert (Ab. 3). Metanotum frontal breit abgerundet ausgeschnitten. Analnaht stark, Analfeld deutlich, Abdominalende in Ventral- und Dorsalsicht ausgeschnitten, in Lateralsicht an der Ventralseite abgeschieft (Abb. 4-6).

Raupe an *Syringa* (manchmal schädlich), *Ligustrum* und *Fraxinus*. Mine von Anfang an platzartig, später gross, braun, aufgebläht, die Raupen leben gruppenweise. Bi- bis trivoltin. Waldränder, Auen, Gebüsch, sekundär Parkanlagen und Gärten.

Gattung ASPILAPTERYX Spuler, 1910

Kleinere Puppen, Kopf in Ventralsicht abgerundet, ohne Frontalfortsatz und Frontalborste (Abb. 13, 14). Pronotum in der Mitte wenig verkürzt (Abb. 15). Dörnchen dorsal am 2.-7. und an der Basalhälfte des 8. Abdominalsegmentes fein, regelmässig (Abb. 17). 7. Segment ventral ohne Leistengebilde. 10. Segment mit 3 Paaren feiner Dörnchen (Abb. 18).

Raupen an den Blättern der Krautpflanzen aus der Familie Plantaginaceae, Lamiaceae (ausnahmsweise Asteraceae) in aufgeblähten Faltenminen, Überwinterung in der Mine als Praepupa. Verpuppung in einem Kokon in oder ausserhalb der Mine. In Mitteleuropa 2 Arten, von denen 1 untersucht werden konnte.

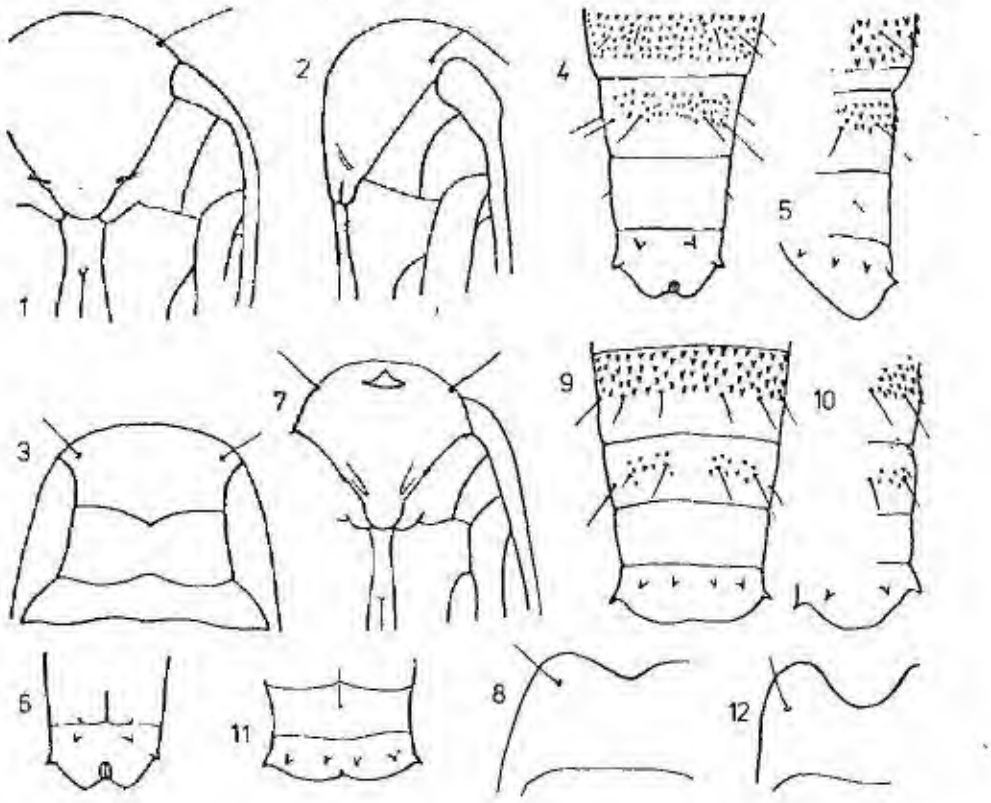

Abb. 1-6 *Gracillaria syringella*, 7-11 *Calybites quadrisignella*, 12 *C. phasianipennella*. 1,7 Kopf in Ventral-, 2 in Lateral-, 3 in Dorsalsicht, 4, 9 Abdominalende in Dorsal-, 5, 10 in Lateral-, 6,11 in Ventralsicht, 8, 12 Metanotum.

Aspilapteryx limosella (Duponchel, 1844)

Puppe 4,8-6,4 x 0,9-1,1 mm (5 ♂, 5 ♀ aus der Slowakei), hell braun, Exuvie bleich, weichhäutig, mässig glänzend. Skulptur fein. 2.-7. Abdominalsegment dorsal mit recht feinen, regelmässigen Dörnchen, die nur in einem rel. schmalen Kaudalstreifen fehlen, 8. Segment nur im Basaldrittel bedornt (Abb. 17). Frons in Ventralsicht vor die Wurzel der Antennae etwas stärker vorgewölbt als bei *Gracillaria* (Abb. 13). Frontalborsten nicht

sichtbar, Clypealborsten klein, Körperborsten deutlich. Clypeus breit, Frontoclypealsutur im Kaudalteil stark gebogen, Palpi maxillares nur angedeutet (Abb. 13, 14). Frons hinten stumpfwinklig (Abb. 15). An der Basis des 2.-4. Abdominalsegmentes eine suprastigmatale Senkung (Abb. 17). 10. Abdominalsegment in Ventralsicht etwas ausgeschnitten, in der Lateralsicht an der Ventralseite nur wenig abgeschieft (Abb. 18).

Raupe an *Teucrium chamaedris*, zuweilen an *Jurinea cyanoides* in einer rötlich gefärbten unterseitigen Faltenmine, bivoltin.

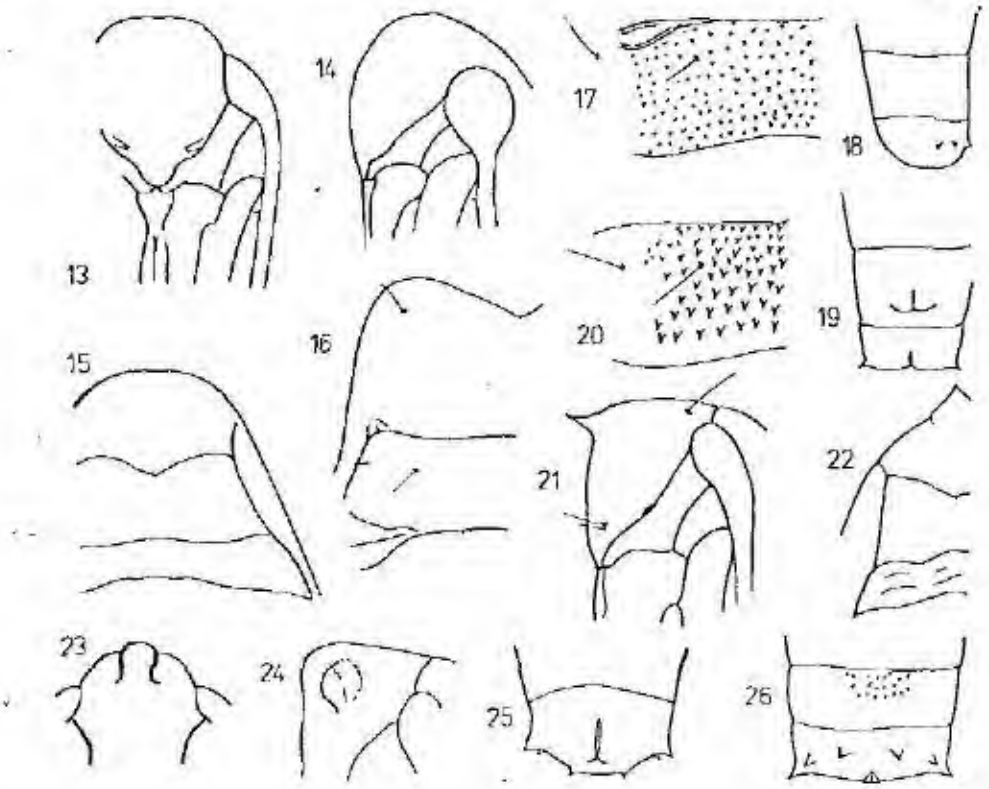

Abb. 13-19 *Aspilapteryx limosella*, 20-22 *Calybites quadrisignella*, 23-25 *Parornix devoniella*, 26 *P. betulae*. 13, 23 Kopf in Ventral-, 14, 21, 24 in Lateral-, 15, 22 in Dorsalsicht, 16 Metanotum und 1. Abdominalsegment, 17, 20 4. Abdominalsegment, 18 Abdominalende in Lateral-, 19, 25 in Ventral-, 26 in Dorsalsicht.

Gattung CALYBITES Hübner, 1822

Puppen ziemlich klein, weisen einem uneinheitlichen Bau auf. Kopf entweder ähnlich wie bei *Caloptilia* (Abb. 21), zum Unterschied von dieser Gattung ist jedoch das 7. Abdominalsegment dorsal nur in der Basalhälfte bedornt (Abb. 9, 10); oder, ähnlich wie

bei *Aspilapteryx* (etwas flacher, Abb. 27, 28), die Ventralseite des 7. Abdominalsegmentes jedoch mit Längsleisten versehen (Abb. 31) und das 10. Segment ohne Einzeldörnchen (Abb. 30); oder mit einem starken, fast in der Längsachse orientierten Stirnfortsatz, von der übrigen Stirn dorsal durch eine Querrinne abgeteilt (Abb. 33-35). Mittlere Abdominalsegmente dann am Niveau der Dorsalborsten mit einem dornlosen Querband und das 9. Segment mit einem Paar von Einzeldörnchen (Abb. 37, 38). Palpi maxillares zuweilen angedeutet. Pronotum in der Mitte nur schwach verkürzt (Abb. 22, 29, 35).

Raupen minieren anfangs Gangplatzminen an Blättern der Pflanzen aus den Familien Rhamnaceae, Polygonaceae oder Hypericaceae, später minieren sie nicht mehr und leben in einem Blattkegel. Sie verpuppen sich in einem Gespinst ausserhalb des Raupengehäuses. Überwinterung als Imago oder Puppe. In Mitteleuropa drei Arten.

Bestimmungstabelle der Arten

1. Frontalfortsatz fehlt (Abb. 27, 28). 7. Abdominalsegment ventral mit Längsleisten (Abb. 31), 9. ohne Einzeldörnchen (Abb. 30-32) ..... *C. phasianipennella*
- Frontalfortsatz vorhanden (Abb. 21, 34). 7. Abdominalsegment ventral ohne Längsleisten, 10. mit Einzeldörnchen (Abb. 37) 2
2(1) Frontalfortsatz ventral orientiert (Abb. 21). 9. Abdominalsegment ohne Einzeldörnchen (Abb. 10) ..... *C. quadrisignella*
- Frontalfortsatz frontal orientiert (Abb. 34). 9. Segment dorsal mit 2 Einzeldörnchen (Abb. 38) ..... *C. auroguttella*

Calybites quadrisignella (Zeller, 1839)

Puppe 5,2 x 1,1 mm (1 ♂ aus Mähren), rötlich braun, Exuvie gelbbraun, rel. stärker sklerotisiert, glänzend. 2.-8. Abdominalsegment dorsal mit relativ starken dunklen Dörnchen, die an der Basis der Segmente kleiner sind (Abb. 20). 7. Segment nur in der basalen Hälfte, 8. vor der Mitte bedornt (Abb. 9, 10). Borsten stark, Frontalborsten gross, Clypealborsten mittelgross. Frons stumpf abgerundet, Frontalfortsatz ventral gerichtet, in der Lateralsicht spitz, in der Dorsalsicht dreieckig, zugespitzt (Abb. 7, 21, 22). Frontoclypealsutur ziemlich gerade, meist mit je einem Eindruck in der Mitte, Labrum abgerundet, Labium scharf abgegrenzt (Abb. 7). Frons hinten stumpfwinklig, Pronotum mit feiner queren Skulptur (Abb. 22). 10. Abdominalsegment abgestumpft, in Ventralsicht hinten etwas ausgeschnitten mit 4 Paaren relativ starker Einzeldörnchen (Abb. 9-11).

Raupe an *Rhamnus* und *Frangula*, anfangs in einer Platzmine im Rippenwinkel, die mit einem Epidermalgang beginnt, dann in einem Blattkegel. Bivoltin, die Imago überwintert. Frische, sonnige Waldränder, Gebüsch.

Calybites phasianipennella (Hübner, 1813)

Puppe 5,3 x 1,1 mm (1 ♂ aus Mähren) schwarz-, Exuvie dunkelbraun, stellenweise am Thorax mit heller Zeichnung, glänzend. Dörnchen dorsal am 2.-7. Abdominalsegment mittelgross (bei 25 x Vergrösssserung sichtbar), am 8. Segment nur die Basalhälfte bedornt. 8.-10. Abdominalsegment dornlos (Abb. 32). Dornlose Kaudalstreifen an mittleren Abdominalsegmenten relativ breit. Frons breit abgerundet. Frontalfortsatz und

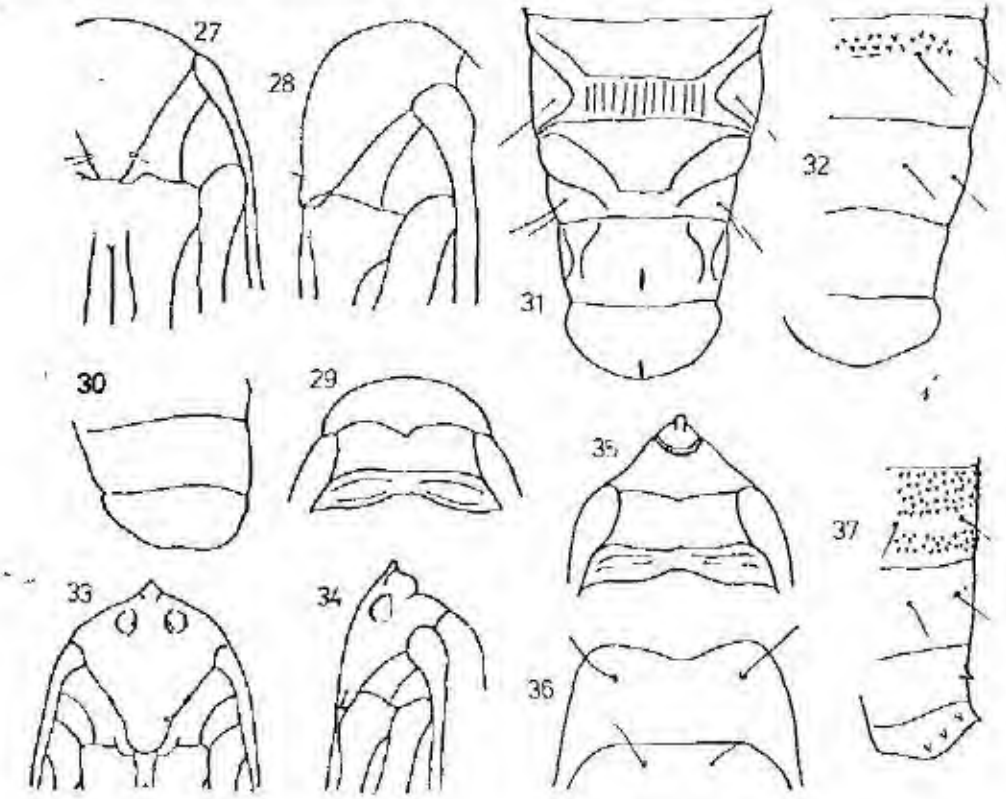

Abb 27-32 *Calybites phasianipennella*, 33-37 *C. auroguttella* 27, 33 Kopf in Ventral-, 28, 34 in Lateral-, 29,35 in Dorsalsicht, 30,37 Abdominalende in Lateral-, 31 in Ventral-, 32 in Dorsalsicht, 36 Metanotum

Frontalborsten fehlen, Clypealborsten mittelgross. Labrum an der Kaudalseite ausgeschnitten. Labium undeutlich, Palpi labiales unscharf abgegrenzt. (Abb. 27, 28). Vertex relativ kurz, Pronotum mit kleinen Senkungen (Abb. 29). Metanotum breit abgerundet, relativ tief ausgeschnittten. 1. Abdominalsegment mit länglichen kaudolateralen Senkungen. 7.-8. Segment ventral mit schrägen Wallgebilden und das 7. ausserdem vor dem Kaudalrand mit parallelen Längsleisten (Abb. 31). Abdominalende abgerundet, Analnaht fein, Einzeldörnchen am 10. Segment nicht sichtbar (Abb. 30-32).

Raupe an Vertretern der Polygonaceae, insbesondere an *Persicaria* und *Rumex*, seltener auch an Chenopodiaceae und Lythraceae. Mine anfangs epidermal, dann wird sie zur Faltenmine und zieht das Blatt stark zusammen. Später lebt die Raupe, nicht mehr minierend, in einem Blattkegel. Verpuppung in einem Gespinst unter einem Blattrandumschlag. Bivoltin, die Imago überwintert. Lichte Laubwälder, Gewässerufer, Feldränder usw.

Calybites auroguttella (Stephens 1835) (Siehe Bemerkung auf der Seite 158)

Puppe 5,3 x 0,9 mm (1 ♂ aus der Slowakei), braun, Exuvie heller, glänzend, mittelfein skulpturiert. Am 2.-8. Abdominalsegment mit mittelgrosser, gleichartiger Bedornung. Ausser dem Kaudalrand auch je ein Querstreifen am Niveau der Dorsalborsten dornlos. Am 8. Segment dorsal sind die Dörnchen nur im Mittelteil der Basalhälfte vorhanden (Abb. 37, 38). Borsten deutlich, Frontalborsten nicht sichtbar, Clypealborsten klein. Frontalfortsatz stark, am Ende abgestumpft, in der Längsachse orientiert, dorsal mit einer Querrinne von Frons abgeteilt, Spitzenteil etwas eingeschnürt. In Lateralsicht daneben je eine Senkung (Abb. 33-35). Clypeogenalsutur mit je einem Eindruck bei der Mitte, Labrum abgerundet, Labium scharf abgegrenzt (Abb. 33). Frons hinten sehr stumpfwinklig, Pronotum mit schwachen Querleisten-gebilden (Abb. 35). Metanotum seicht, abgerundet ausgeschnitten (Abb. 36). 9. Abdominalsegment an der Dorsalseite mit einem Einzeldörnchenpaar (Abb. 37, 38), ♂ Genitalfeld gross, scharf abgegrenzt (Abb. 39), Abdominalende in Ventralsicht ausgeschnitten. 10. Segment mit 4 Paaren starker Einzeldörnchen (Abb. 37-39).

Raupe an *Hypericum*. Einer epidermalen Anfangsmine folgt eine Faltenmine, die den Blatt stark zusammenzieht. Später lebt die Raupe in einem Blattkegel. Verpuppung in einem weisslichen Kokon an dem Blatt. Bivoltin, Überwinterung als Puppe. Sonnige Böschungen, Schlagflächen usw.

Gattung MICRURAPTERYX Spuler, 1910

Puppen ziemlich klein, Kopf mit starkem, schräg frontoventral orientiertem und am Ende abgestumpftem Frontalfortsatz, mit Leisten, in Ventralsicht vor die Basen der Antennae stark vorgezogen (Abb. 40), in Lateralsicht mit je einer Senkung (Abb. 41). Labium unscharf-, Palpi labiales scharf abgegrenzt, Palpi maxillares nicht sichtbar (Abb. 40). Pronotum hinten stark ausgeschnitten, im Mittelteil etwa 2x kürzer (schmäler) als lateral (Abb. 42). 2.-7. Abdominalsegment dorsal nur mit winzigen Dörnchen, diese ganz klein auch dorsal am 8. und an der Basis des 9. Segmentes. Abdominalringe subdorsal und lateral mit feinen Leistengebilden (Abb. 43, 44), 10. Segment mit 3 Paaren von Einzeldörnchen (Abb. 44, 45).

Raupe lebt an bestimmten Fabaceae (*Cytisus* und verw.) lebenslang in einer Platzmine, welche mit einem Gang beginnt, verpuppt sich ausserhalb des Gehauses, Überwinterung als Puppe. An warmtrockenen Standorten. In Mitteleuropa nur eine Art.

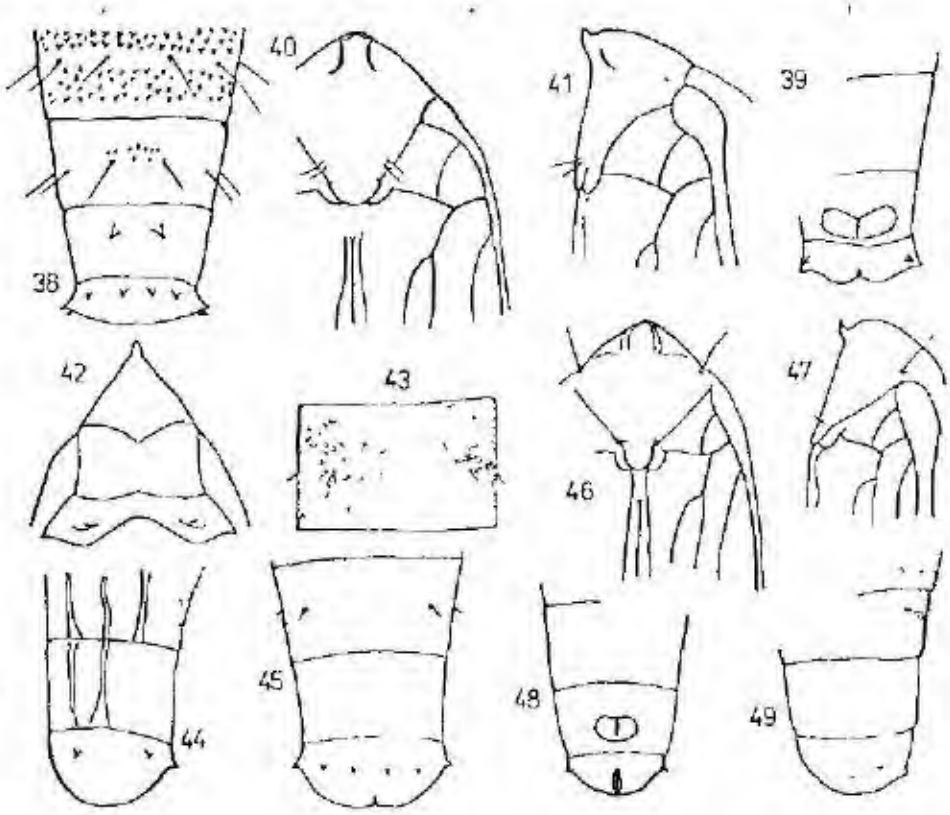

Abb 38, 39 *Calybites auroguttella*, 40-45 *Micrurapteryx kollariella*, 46-49 *Parectopa robiniella* 38, 45 Abdominalende in Dorsal-, 39, 48 in Ventral, 44, 49 in Lateralsicht, 40, 46 Kopf in Ventral , 41, 47 in Lateral-, 42 in Dorsalsicht, 43 4 Abdominalsegment in Dorsalsicht

Micrurapteryx kollariella (Zeller, 1839)

Puppe 4,5-4,8 x 1-1,1 mm (2 ♂ aus der Slowakei), hellbraun, Exuvie noch heller, mässig glänzend, Skulptur etwas rauh. Bedornung am Abdomen so fein, dass das 1. und 2. Segment in der Skulptur voneinander nur wenig abweicht. Dorsal an mittleren Segmenten die Dörnchen am 1/3 der Segmentlänge noch an stärksten (Abb. 43). Borsten relativ schwach, Frontalborsten nicht sichtbar, Clypealborsten klein. Frons in Ventralsicht kegelförmig vorgezogen, der starke Fortsatz mit dunklen Seitenleisten,

Labrum abgerundet, Frontoclypealsutur mit je einem Eindruck, Labium kaum abgegrenzt (Abb. 40). In Lateralsicht ist der Fortsatz schräg vorgezogen, spitz, jedoch am Ende abgestumpft, Umriss kaudalwärts davon etwas konkav, dann konvex, eine laterale Senkung deutlich (Abb. 41). In Dorsalsicht ist Frons dreieckig, Spitze vorgezogen, abgestumpft. Frons hinten bogig stumpfwinklig. Vertex relativ lang. Pronotum mit je einer gerunzelten Senkung an den Seiten (Abb. 42). Metanotum seicht, abgerundet ausgeschnitten, 2.-8. Abdominalsegment mit subdorsalen und lateralen, 9. nur mit lateralen Längsleisten (Abb. 43, 44). 1. Segment vorne mit Querrunzeln, 10. am Ende abgerundet, mit 3 Paaren von mittelgrossen Einzeldörnchen (Abb. 44, 45).

Raupe an *Lembotropis, Cytisus, Laburnum, Genista, Sarothamnus*, Platzminen gross, dunkelbraun, können gewechselt werden. Verpuppung in einem braunen pergamenartigen Kokon am Blatt. Bivoltin, die Puppe überwintert. Sonnige Lehnen, Waldsteppe usw.

Gattung PARECTOPA Clemens, 1860

Puppen mittelgross bis klein, denen der Gattung *Micrurapteryx* ziemlich ähnlich. Frontalfortsatz mehr frontal orientiert, sehr spitz, Frons in Lateralsicht dahinten stark gewölbt (Abb. 46, 53). Labium überall stark abgegrenzt (Abb. 46, 54). Metanotum in der Mitte etwa 3 x verkürzt (verschmälert) (Abb. 50, 55). Dorsaldörnchen am Abdomen winzig (Abb. 57). Abdominalsegmente höchstens mit lateralen Längsleisten, das 10. mit kleinen Einzeldörnchen (Abb. 49, 58). Raupen leben in Gangplatzminen ebenfalls an Fabaceae, der Kot wird von ihnen beseitigt. Verpuppung ausserhalb der Mine in einem Kokon. Überwinterung als Imago oder Puppe. In Mitteleuropa drei Arten (eine von ihnen eingeschleppt), zwei konnten untersucht werden.

Bestimmungstabelle der Arten:

1. Frontalborste gross (Abb. 46, 47). Frontalfortsatz in Dorsalsicht kaum vorgezogen, Frons hinten ganz stumpfwinklig (Abb. 50) ..... *P. robiniella*
- Frontalborste reduziert (Abb. 53, 54). Frontalfortsatz in Dorsalsicht deutlich vorgezogen. Frontovertikalsutur scharfwinklig, Seiten gebogen (Abb. 55) ..... *P. gradatella*

Parectopa robiniella Clemens, 1860

Puppe 2,8-3,4 x 0,7-0,9 mm (5 ♂, 3 ♀ aus der Slowakei). Puppe braun bis schwarzbraun, ± dunkler gefleckt, Exuvie hellbraun, dünnhäutig. Skulptur fein. 2.-7. Abdominalsegment dorsal durchgehend von Frontal- zum Kaudalrand mit winzigen Dörnchen bedeckt, die bei 100x Vergrösserung unterscheidbar sind, am 8. Segment sind Dörnchen nur im Basalteil (Abb. 51). Borsten relativ klein, die Frontalborsten jedoch deutlich. Frontalfortsatz in Lateralsicht ventralwärts-, seine Spitze jedoch schräg frontoventralwärts orientiert, spitz, Umriss kaudalwärts davon stark gewölbt (Abb. 47). In

Dorsalsicht ist der Fortsatz breit dreieckig, ein bisschen skulpturiert (Abb. 50). Labrum abgerundet, Labium auch an der Basis scharf abgegrenzt (Abb. 46). Frons hinten ganz stumpfwinklig, Vertex kürzer als Frons, Pronotum in der Mitte zu etwa 1/3 der grössten Länge verkürzt mit je einer seichten Quersenkung (Abb. 50). Metanotum breit, mittelseicht ausgeschnitten, 1. Abdominalsegment mit einigen Quer- und Schrägrunzeln (Abb. 52). Abdominalende abgerundet, Analnaht relativ lang, ♂ Genitalfeld angedeutet. Die Einzeldörnchen am 10. Abdominalsegment winzig (Abb. 48, 49, 51).

Eine von Nordamerika eingeschleppte Art (Ungarn, Österreich, Südslowakei). Raupe miniert die Blätter von *Robinia*, Verpuppung in einem festen schmutzig weisslichen Kokon ausserhalb der Mine, die Puppe überwintert. Mit Vorliebe an trockenwarmen Standorten. An Robinien schädlich.

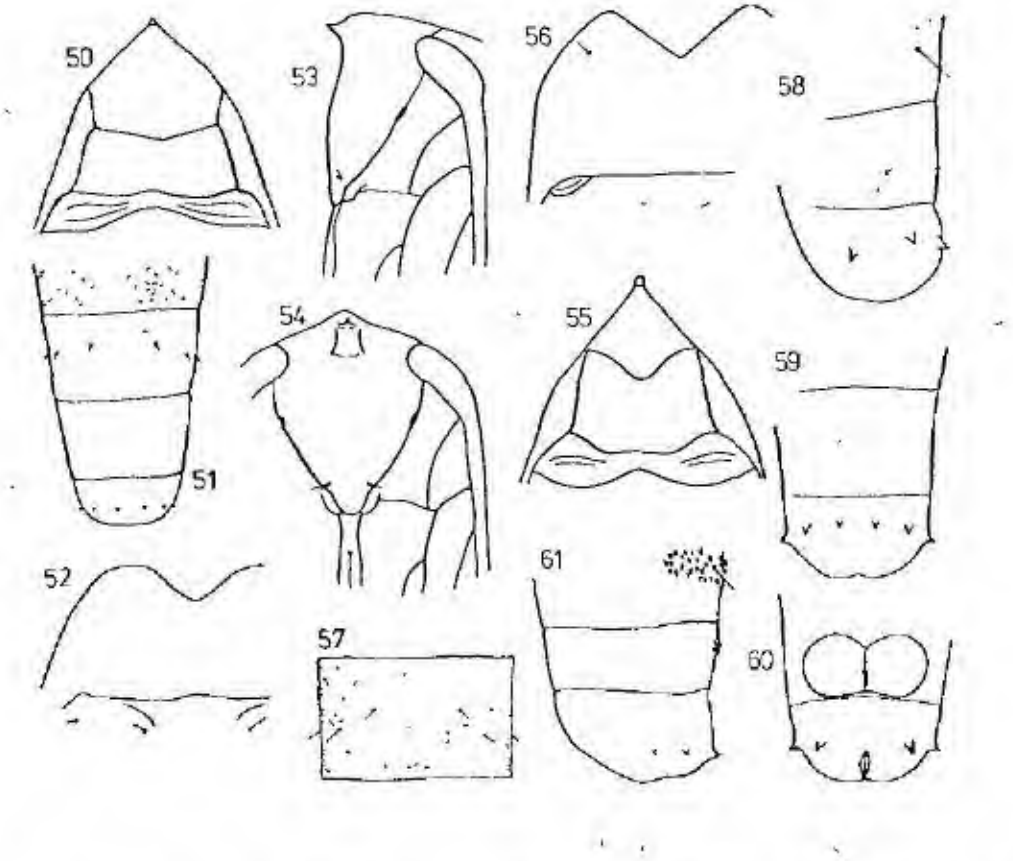

Abb. 50-52 *Parectopa robiniella*, 53-60 *P. gradatella*, 61 *Parornix fagivora*. 50, 55 Kopf und Pronotum in Dorsal-, 53 Kopf in Lateral-, 54 in Ventralsicht, 52, 56 Metanotum, 57 4. Abdominalsegment in Dorsalsicht, 58, 61 Abdominalende in Lateral- 59 in Dorsal-, 60 in Ventralsicht.

Parectopa gradatella (Herrich Schäffer, 1856)

Puppe 5,0-5,5 x 1,1-1,3 mm (2 ♂, 2 ♀ aus Norwegen), schwarzbraun, Exuvie heller, etwas rauh skulpturiert, dorsal am 3.-7. Abdominalsegment relativ wenig rauher als sonst. Bei 100 x Vergrösserung dort, insbesondere in der Basalhälfte der Segmente dichte, winzige Bedornung (Abb. 57). Borsten klein, Frontalborsten nicht sichtbar. Frontalfortsatz spitz, etwas schräg ventralwärts orientirt, in Lateralsicht dorsal von ihm im Umriss des Kopfes ein Höcker (Abb. 53). In Dorsalsicht ist der Fortsatz deutlich vorgezogen (Abb. 55). Frontoclypealsutur mit einem Eindruck nahe der Mitte, Labium an der Basis rel. breit, scharf abgegrenzt (Abb. 54). Frons hinten spitzwinklig, Winkelseiten geschwungen. Vertex kaum kürzer als Frons. Pronotum in der Mitte stark verkürzt mit je einer Quersenkung (Abb. 55). Metanotum breit, winkelartig ausgeschnitten (Abb. 56). Abdominalende abgerundet. ♂ Genitalsutur sehr gross, Analnaht lang. Einzeldörnchen relativ grösser als bei *P. robiniella* (Abb. 58-60).

Raupe an *Lathyrus tuberosus* auch an *Vicia sepium*, Gangplatzmine oberseitig. Verpuppung in einem Kokon ausserhalb der Mine. Bivoltine Art, Überwinterung wahrscheinlich als Imago.

Gattung PARORNIX Spuler, 1910

Puppen mittelgross bis klein. Kopf in Ventralsicht vor die Wurzel der Antennae ± stark, meist kegelförmig vorgezogen oder abgerundet (Abb. 62, 75, 103). Fortsatz gross, breit in Ventralsicht mit je einer dunklen Leiste gesäumt, mit abgesetzter Spitze, oder ohne Spitze, abgerundet (Abb. 91, 105). Clypeus relativ lang, trapezförmig, Frontalborsten nicht sichtbar, Clypealborsten mittelgross, deutlich, Labrum abgerundet, Labium scharf abgegrenzt, Palpi maxillares nicht sichtbar (Abb. 63). In Lateralsicht bildet der Kopf meist einen Winkel von 60-90°, manchmal stark abgerundet, die Spitze, wenn vorhanden, scharf und ± abgesetzt. Frons dorsal davon mässig- oder nicht gewölbt. Grubenartige Senkungen ± tief und deutlich (Abb. 63, 74, 104). In Dorsalsicht ist der Fortsatz breit, vorne abgerundet, seltener zugespitzt (Abb. 75, 82), oft mit abgesetzter Spitze (Abb. 64, 83). Vertex ungefähr so lang wie die Frons. Pronotum im Mittelteil nur schwach verkürzt und mit wenig ausgeprägten Gebilden (Abb. 64). Proboscis kaum länger als die Vorderbeine (Abb. 165). An Abdominalsegmenten lateral oft Leistengebilde. Segment 2-7 dorsal mit relativ grossen, ± dünnen Dörnchen (bei 10-20 x Vergr. sichtbar), ein Kaudalband bleibt dornfrei (Abb. 70, 78), 8. Segment nur in der Basalhälfte bedornt (Abb. 66, 87), auch das 9. Segment manchmal mit einer Dorngruppe (Abb. 26, 73). Abdomen stumpf abgerundet (Abb. 26), bei dem ♀ oft kegelförmig vorgezogen (Abb. 73). Analnaht einfach oder verzweigt, mit oder ohne ein Analfeld (Abb. 71, 86, 114), 10. Segment mit 3 oder 4 Paaren von Einzeldörnchen (Abb. 67, 121).

Die Raupen leben an Gehölzern aus den Familien Salicaceae, Corylaceae, Betulaceae, Fagaceae, Rosaceae, Aceraceae. Sie minieren vorwiegend nur jung Gangplatz-, Platz bzw. Faltenminen. Später jedoch, meistens nicht mehr minierend, leben sie unter einem umgeschlagenen Blattrand, ausnahmsweise in einem Blattkegel. Verpuppung in einem Gespinst entweder im Gehäuse der Raupe, unter einem besonderen Blattrandumschlag, bzw. in einem flachen Kokon am Blatt. Die meisten Arten sind bivoltin, überwintern als Puppe. Sie bewohnen die Randzonen der Waldbestände, buschige Lehnen, Gärten usw.

In Mitteleuropa rd. 15 Arten von denen 11 untersucht werden konnten. Die morphologischen Merkmale variieren ziemlich, individuell, geschlechtsgebunden usw. Da von mehreren Arten nur wenig Material vorlag, ist die folgende Bestimmungstabelle als vorläufig zu bezeichnen.

Bestimmungstabelle der Arten

1 10. Abdominalsegment mit 4 Paaren von Dörnchen (Abb. 67) 2
- 10. Abdominalsegment mit 3 Paaren von Dörnchen (Abb. 86) 5
2(1) 9. Abdominalsegment dorsal mit einer Dörnchengruppe (Abb. 121, 128) 3
- 9. Abdominalsegment dorsal ohne eine Dörnchengruppe (Abb. 94) 4
3(2) Frontalfortsatz in Ventral- und Dorsalsicht mit parallelen Seiten, am Ende recht stumpf, Spitze abgesetzt (Abb. 115, 117) ..... *P. finitimella*
- Frontalfortsatz in Ventral- und Dorsalsicht mit allmählich zusammenlaufenden Seiten, spitzer, Spitze weniger abgesetzt (Abb. 122, 124) ..... *P. torquilella*
4(3) Im Winkel an der Basis der Hinterflügel je zwei Ausrandungen, in deren Mitte ein Lappen. 1. Abdominalsegment lateral mit schrägen Runzeln (Abb. 99). Dornen am 10. Segment rel. klein, Analnaht ungezweigt, Analfeld deutlich (Abb. 102) ..... *P. mista*
- *Im Winkel an der Basis der Hinterflügel eine einfache Verdickung* (Abb. 92). 1. Abdominalsegment ohne Runzelung. Dornen am 10. Segment rel. gross, Analnaht gezweigt ohne deutliches Analfeld (Abb. 95) ..... *P. petiolella*
5(1) Frontalfortsatz in Lateralsicht stumpf abgerundet, ohne Spitze (Abb. 24, 76) 6
- Frontalfortsatz in Lateralsicht am Ende spitz (Abb. 63, 84) 7
6(5) Kopfende in Lateralsicht fast rechtwinklig mit einer kleinen, von der Basis der Antennae weit entfernter Senkung (Abb. 24). Analnaht ohne deutliches Analfeld (Abb. 25) ..... *P. devoniella*
- Kopfende in Lateralsicht spitzwinklig mit einer grösseren Senkung, die fast zur Basis der Antennae ausgedehnt ist (Abb. 76). Analnaht relativ kürzer mit einem deutlichen Analfeld (Abb. 80) ..... *P. carpinella*
7(6) Domgruppe dorsal am 8. Abdominalsegment dreieckig (Abb. 66) ..... *P. fagivora*
- Domgruppe dorsal am 8. Abdominalsegment bandartig (Abb. 73, 87) 8
8(7) Domgruppe dorsal am 9. Abdominalsegment fehlend (Abb. 87) 9
- Domgruppe dorsal am 9. Abdominalsegment vorhanden (Abb. 26, 73) 10
9(8) Frontalfortsatz in Dorsalsicht zugespitzt (Abb. 82). Rel. grösser, stärker sklerotisiert ..... *P. anguliferella*
- Frontalfortsatz in Dorsalsicht abgerundet, Spitze abgesetzt (Abb. 110). Rel. kleiner, schwächer sklerotisiert ..... *P. scoticella*
10(9) In Lateralsicht, kaudal von der Frontalspitze, eine Erhöhung (Abb. 104), an der Basis der Fortsatzes je ein Börstchen (Abb. 103). In Dorsalsicht Frons vorne abgerundet ohne Spitze (Abb. 105). Domgruppe am 9. Segment relativ gross (Abb. 26) ..... *P. betulae*
- In Lateralsicht kaudal von der Frontalspitze keine Erhöhung, Basis des Fortsatzes ohne Börschen (Abb. 68, 69). In Dorsalsicht Frons vorne mit abgesetzter Spitze (Abb. 74), Dörnchengruppe am 9. Abdominalsegment rel. klein (Abb. 73) ..... *P. anglicella*

Parornix fagivora Frey (1861)

Puppe 4,5 x 1,5 mm (1 ♂ aus Mähren), rötlich braun, Exuvie heller. Frons mit starken Leisten, Seiten laufen in Dorsalsicht zusammen, die steile abgesetzte Spitze auch in Dorsalsicht sichtbar, Senkungen rel. klein (Abb. 62-64). Mittlere Abdominalsegmente mit breiten dornlosen Streifen vorne und insbesondere hinten, Bedornung rel. grob, dünn, am 8.Segment dorsal dreieckig mit der Spitze frontalwärts (Abb. 66).

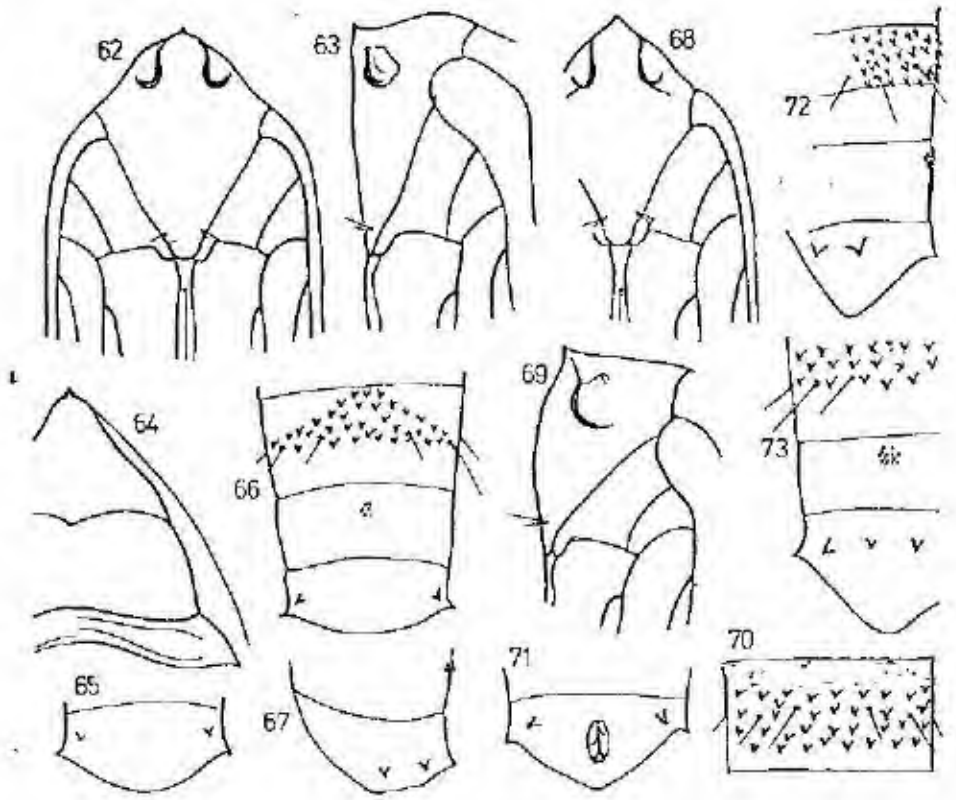

Abb. 62-67 *Parornix fagivora*, 68-73 *P. anglicella*. 62, 68 Kopf in Ventral-, 63, 69 in Lateral-, 64 Kopf und Pronotum in Dorsalsicht, 65, 66, 73 Abdominalende in Dorsal-, (65, 73 ♂, 66 ♀), 67, 72 in Lateral-, 71 in Ventralsicht, 70 4. Abdominalsegment in Dorsalsicht.

Dörnchengruppe dorsal am 9. Segment klein. Analfeld nicht sichtbar. 10. Segment mit 3 Dörnchenpaaren (Abb. 65-67).

Raupe an Buchen, Verpuppung meist in ihrem Gehäuse. Randzone der Buchenbestände.

Parornix anglicella (Stainton, 1850)

Puppe 4-4,5 x 1,1-1,2 mm (1 ♂, 2 ♀ aus der Slowakei), hellbraun, Exuvie bleich. Kopf in Ventralsicht stark kegelförmig vorgezogen, in Lateralsicht die Spitze schräg, kaum abgesetzt, Umriss kaudal von ihr kaum gewölbt, Senkung unscharf, grösser, in Dorsalsicht Frons vorne abgerundet mit abgesetzter Spitze (Abb. 68, 69, 74). Dörnchen

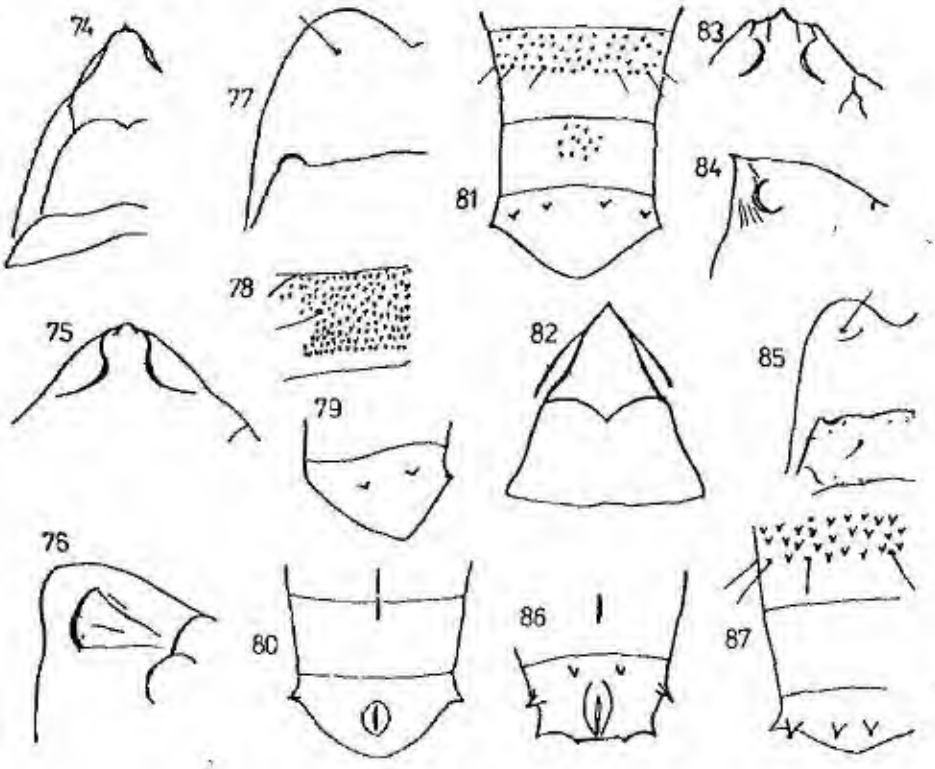

Abb. 74 *Parornix anglicella*, 75-81 *P. carpinella*, 82-87 *P. anguliferella*. 74, 82 Kopf bzw. Pronotum in Dorsal-, 75, 83 in Ventral-, 76, 84 in Lateralsicht, 77, 85 Metanotum bzw. 1. Abdominalsegment, 78 4. Abdominalsegment in Dorsalsicht, 79 Abdomenende in Lateral-, 80, 86 in Ventral-, 81, 87 in Dorsalsicht.

am Abdomen dorsal gross, rel. dünn, dornloses Kaudalband mittelbreit (Abb. 70), am 8. Segment die Dörnchen bandartig, am 9. eine kleine Dorngruppe. Analnaht gezweigt, Analfeld deutlich. Am 10. Segment 3 Paare von Dörnchen (Abb. 71-73).

Raupe an *Crataegus*, erwachsen in einem Blattkegel. Verpuppungskokon meist ausserhalb des Raupengehäuses. Waldränder, buschige Lehnen, Hecken.

Parornix carpinella (Frey, 1861)

Puppe 3,7 x 0,7 mm(1 ♂ aus der Slowakei), rötlich hellbraun, Exuvie heller. Frons in Ventralsicht mit starken Leisten, Spitze nur als abgerundeter Höcker, in Lateralsicht spitzwinklig abgerundet ohne Spitze, Senkung gross, bis zur Basis der Antenna vorgezogen (Abb. 75, 76). Bedornung rel. fein, dornlose Kaudalstreifen schmal, rauh (Abb. 78). Metanotum winklig ausgeschnitten, an der Basis der Hinterflügel ein bogiger Ausschnitt (Abb. 77). 9. Segment dorsal mit einer Dörnchengruppe, 10. Segment mit 3 Dörnchenpaaren. Analnaht einfach, Analfeld deutlich (Abb. 79-81).

Raupe an *Carpinus betulus*. Randzone der Hainbuchenbestände.

Parornix anguliferella (Zeller, 1847)

Puppe 5,5-6,5 x 1,3-1,5 mm (2 ♂, 1 ♀ aus der Slowakei und aus Mähren), rötlich gelbbraun, stärker sklerotisiert. Kopf in Ventralsicht etwas trapezförmig vorgezogen mit dicken konkaven Leisten, vorne stumpfwinklig, Spitze abgesetzt (Abb. 83). In Lateralsicht Spitze scharf, schräg, dahinten der Kopf mässig gewölbt, Senkungen rel. tief, klein (Abb. 84). In Dorsalsicht ist Frons allmählich, dann plötzlich zusammenlaufend, Spitze deutlich, nicht abgesetzt, hinten scharfwinklig begrenzt, Winkelseiten bogig (Abb. 82). Metanotum nahe des Basalwinkels von Hinterflügeln mit je einem lappigen Ausläufer, Frontalausschnitt abgerundet, 1. Abdominalsegment frontal und kaudal etwas skulpturiert. Dorsaldörnchen gross, dünn, nach hinten verkleinert (Abb. 88), am 8. Segment bandartig, am 9. fehlend. Analnaht einfach, Analfeld deutlich. Am 10. Segment 4 Paare rel. grosser Dörnchen (Abb. 86, 87).

Raupe an *Pirus communis*, Verpuppung in flachem weisslichem Kokon an einem Blatt. Warmtrockene Standorte, Waldsteppe, buschige Lehnen.

Parornix devoniella (Stainton, 1850)

Puppe 4,5 x 0,7-0,9 mm (1 ♂, 3 ♀ aus der Slowakei), *P. carpinella* ähnlich, Kopf in Lateralsicht fast rechtwinklig, Fortsatz abgerundet, ohne Spitze, Senkung abgerundet, nicht vorgezogen, rel. klein (Abb. 23, 24). An der Basis der Hinterflügel meist zweilappige Ausschnitte. Dornlose Kaudalstreifen der Abdominalsegmente breiter. Bedornung rel. grösser. Dorngruppe am 9. Segment rel. stark. Analnaht lang, am Ende gezweigt, Analfeld kaum unterscheidbar (Abb. 25), 3 Paare von Dörnchen am 10. Segment.

Raupe an *Corylus*, Verpuppung unter einem Blattumschlag. Randzone der Wälder, Lichtungen, buschigen Lehnen.

Parornix petiolella (Frey, 1861)

Puppe rel. gross, 5,9 x 1,1 mm (1 ♂ aus der Slowakei), hellbraun, Exuvie bleich, Stirnfortsatz in Ventral- und Dorsalsicht mit parallelen Seiten, dann plötzlich zugespitzt, spitz (Abb. 89, 91). Fortsatz in Lateralsicht gross, frontoventral gerichtet, Kopf dahinten deutlich gewölbt, Senkungen rel. schwach (Abb. 90). Metanotum breit winkelig

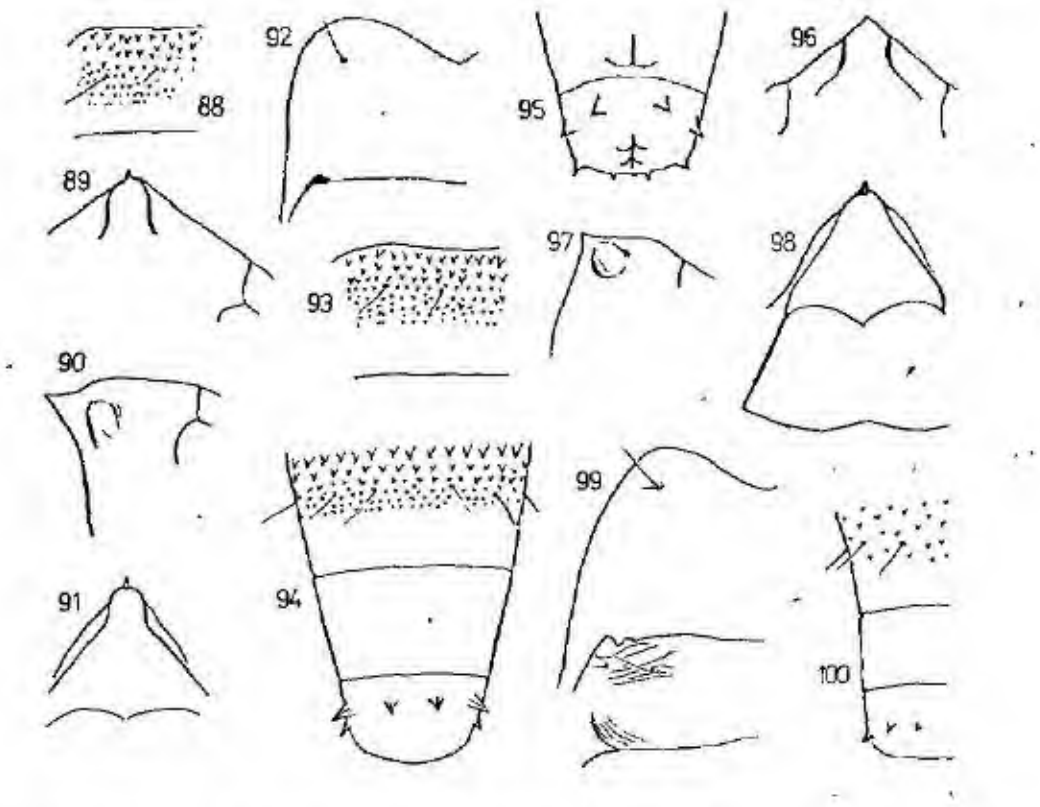

Abb 88 *Parornix anguliferella*, 89-95 *P. petiolella*, 96-100 *P. mixta*, 88, 93 4. Abdominalsegment, Dorsalsicht, 89, 96 Kopf in Ventral-, 90, 97 in Lateral-, 91, 98 in Dorsalsicht, 92, 99 Metanotum bzw. 1. Abdominalsegment, 94, 100 Abdominalende in Dorsalsicht.

ausgeschnitten, an der Basis der Hinterflügel eine verdickte Ausbuchtung (Abb,. 92). Die Dornen am 2.-7. Abdominalsegment kaudalwärts verkleinert, dornloser Kaudal-streifen recht breit (Abb. 93). 9. Segment ohne Dörnchen (Abb. 94), Analnaht verzweigt, Analfeld undeutlich (Abb. 95), am 10. Segment 4 Paare grosser Dörnchen (Abb. 94, 95).

Raupe an *Malus* in oberseitiger Mine, dann unter einem nach oben umgeschlagenem Blattrand, Verpuppung meist daselbst. Waldränder, buschige Lehnen, Gärten.

Parornix mixta Triberti, 1979

Puppe 4,7 - 5,1 x 0,9 - 1,1 mm (4 ♂, 4 ♀ aus der Slowakei), hell braun, Exuvie bleich gelbbraun, glänzend. Seiten des Frontalfortsatzes nur in der Kaudalhälfte parallel, dann zugespitzt, Leisten stark (Abb. 96, 98). In Lateralsicht die Spitze kleiner, sehr spitz, Kopf dahinten sehr schwach gewölbt, Senkungen klein, seicht (Abb. 97). Metanotum

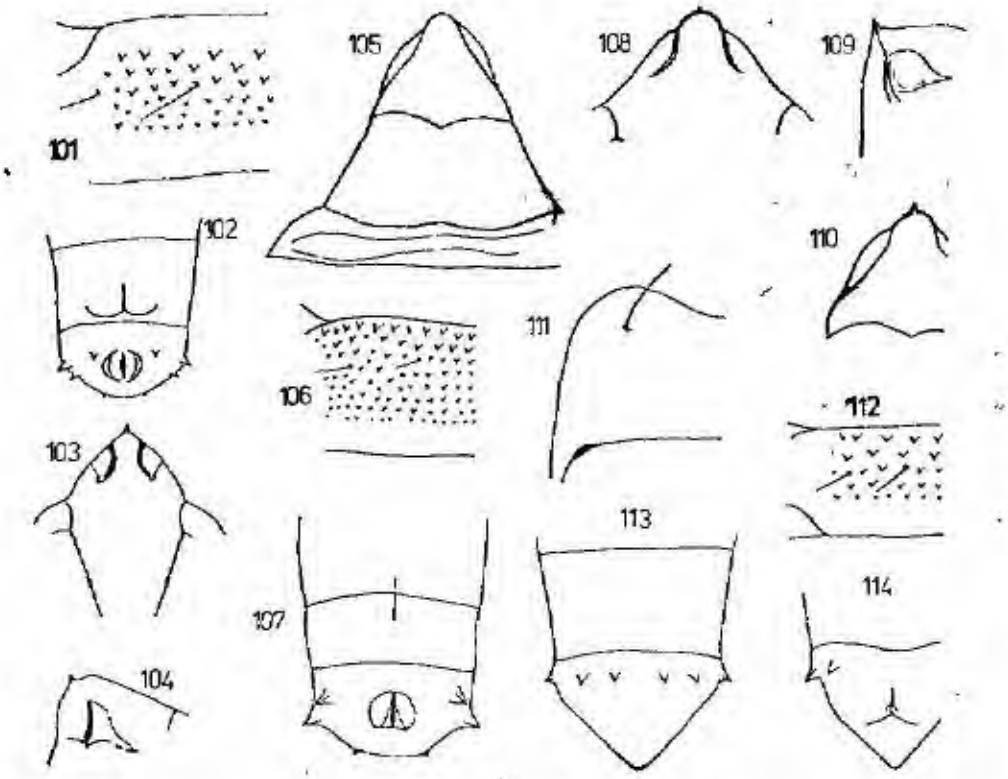

Abb. 101-102 *Parornix mixta*, 103-107 *P. betulae* 108-114 *P. scoticella*, 101, 106, 112 4. Abdominalsegment, Dorsalsicht, 102, 107, 114 Abdominalende in Ventralsicht, 103, 108 Kopf in Ventral-, 104, 109 in Lateral-, 105, 110 Kopf bzw. Pronotum in Dorsalsicht, 111 Metanotum, 113 Abdominalende in Dorsalsicht.

frontal breit winklig, an der Basis der Hinterflügel 2x ausgeschnitten, dazwischen ein Lappen. 1. Abdominalsegment lateral schräg gerunzelt (Abb. 99). 2.-7. Segment dorsal dünn bedornt, dornloser Kaudalstreifen breit (Abb. 101). 9. Segment ohne Dörnchen. Analfeld deutlich, Analnaht einfach, 10. Segment mit 4 Paaren kleinerer, spitzer Dörnchen (Abb. 102).

An *Spiraea media* in Slowakischem Karst, A. Laštůvka lgt. (sonst Italien). Verpuppung unter einem umgeschlagenen Blattrand. Felssteppe.

Parornix betulae (Stainton, 1854)

Puppe 5,0 - 7,7 x 1,0 - 1,3 mm (2 ♂ aus Mähren und der Slowakei), rotbraun, glänzend, Exuvie heller. Frons in Ventralsicht stark vorgezogen, spitz gewölbt, Leisten konkav, bei deren Kaudalende ein Börstchen (Abb. 103). Frontoclypealnaht mit einem Eindruck. In Lateralsicht die Frontalspitze klein, Kopf dahinten stark erhoben. Leisten stark, Lateralsenkungen tief (Abb. 104). In Dorsalsicht Frons vorne abgerundet, Spitze nicht sichtbar (Abb. 105). Metanotum abgerundet ausgeschnitten. Mittlere Abdominalsegmente mit Dörnchen, die sich kaudal verkleinern, dornloser Kaudalstreifen mittelbreit (Abb. 106). 9. Segment mit rel. grosser Dörnchengruppe (Abb. 26). Analnaht dick, Analfeld deutlich (Abb. 107). 10. Segment mit 3 Paaren deutlicher Dörnchen.

Raupe an *Betula*, Verpuppung unter einem Blattumschlag. In Birkenbeständen, insbes. deren Randzonen.

Parornix scoticella (Stainton, 1850)

Puppe 4,5 -5,6 x 0,9 - 1,2 mm (5 ♂, 5 ♀ aus der Slowakei), hellbraun, Exuvie bleich. *P. anglicella* an ähnlichsten. Frontalfortsatz in Ventral- und Dorsalsicht breit mit parallelen Seiten, am Ende abgerundet mit abgesetzter Spitze (Abb. 108, 110). In Lateralsicht die kleine Spitze rel. steil, Kopf dahinten sehr sanft gewölbt, Senkung deutlich (Abb. 109). Metanotum frontal seicht, abgerundet ausgeschnitten, Winkel an der Hinterflügel-Basis abgerundet, verdickt (Abb. 111), 1. Abdominalsegment rel. glatt. Mittlere Abdominalsegmente dünn bedornt, dornlose Kaudalstreifen breit (Abb. 112). 9. Abdominalsegment ohne Dörnchen (Abb. 113). Analnaht stark gezweigt, Analfeld undeutlich (Abb. 114). 10. Segment mit 3 Paaren deutlicher Dörnchen.

Raupe an *Sorbus aucuparia* in einer unterseitigen Faltenmine, oft nach deren Verlassung unter einem umgeschlagenen Blattrand. Verpuppung unter einem Blattumschlag, Kokon gelblich. Oft an Ebereschen im Unterwuchs eines Fichtenbergwaldes.

Parornix finitimella (Zeller, 1850)

Puppe 5,1 x 1,1 mm (1 ♂ aus Böhmen), braun. Exuvie heller, glänzend. Frontalfortsatzt in Ventral- und Dorsalsicht mit parallelen Seiten, breit, am Ende stumpf abgerundet mit abgesetzter Spitze (Abb. 115, 117). In Lateralsicht Spitze klein, recht steil, Leisten stark, Senkungen deutlich, ziemlich klein. Kaudal von der Spitze der Kopf schwach gewölbt (Abb. 116). Metanotum breit, abgerundet ausgeschnitten (Abb. 118). Bedornung am 2.-7. Abdominalsegment relativ fein und dünn, dornloser Kaudalstreifen schmal (Abb. 119). 9. Segment mit einer Dorngruppe (Abb. 121). Analnaht dick, gezweigt, Analfeld undeutlich (Abb. 120). 10. Segment mit 4 Paaren starker Dörnchen (Abb. 121).

Raupe an *Prunus*, insbes. *P. spinosa*, anfangs in einer Faltenmine zwischen Nebenripen, später unter umgeschlagenem Blattrand, das Gehäuse wechselnd. Lehnen, Waldränder usw.

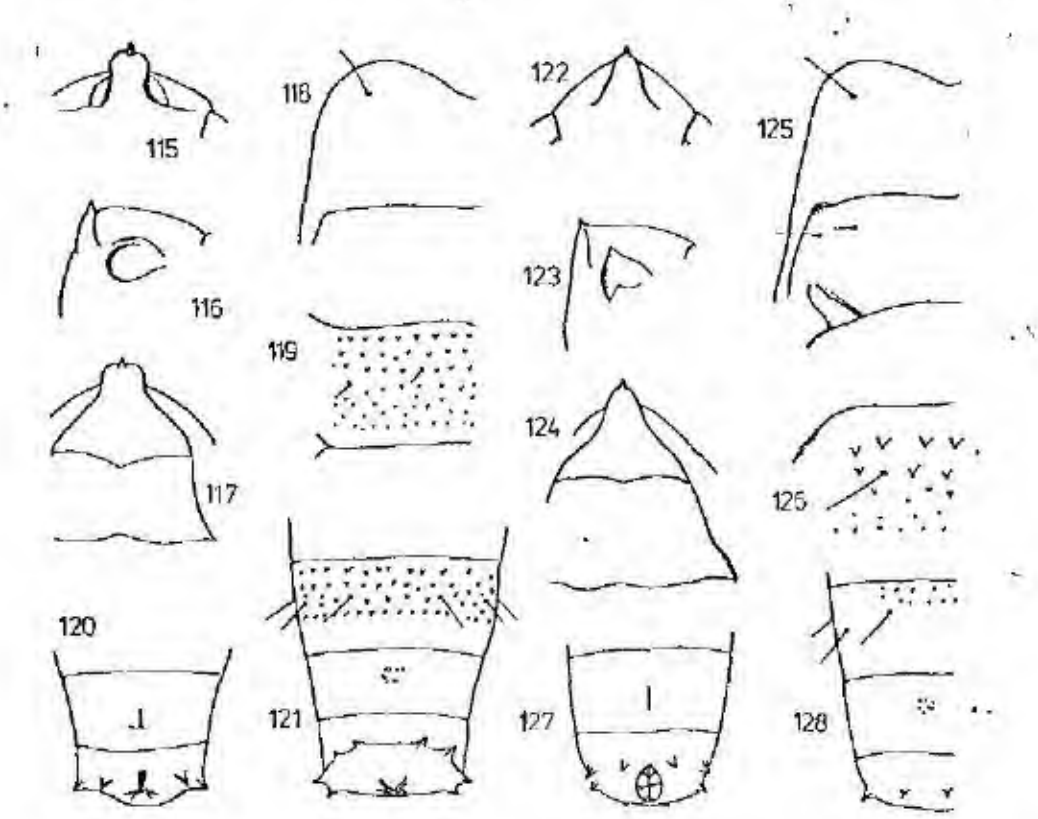

Abb. 115-121 *Parornix finitimella*, 122-128 *P. torquilella*. 115, 122 Kopf in Ventral-, 116, 123 in Lateral-, 117, 124 in Dorsalsicht, 118, 125 Metanotum, 119, 126 4. Abdominalsegment in Dorsalsicht, 120, 127 Abdominsende in Ventral-, 121, 128 in Dorsalsicht.

Parornix torquilella (Zeller, 1850)

Puppe rel. gross, 6,5 - 7,5 x 1,8 - 2,2 mm (5 ♂, 5 ♀ aus der Slowakei und aus Polen), gelblich braun, Exuvie heller, glänzend. Kopf in Dorsal- und Ventralsicht gewölbt, Fortsatz mit allmählich zusammenlaufenden, am Ende spitzer abgerundeten Seiten, Spitze weniger abgesetzt (Abb. 122, 124). Spitze in Lateralsicht klein, steil, Kopf dahinten sehr sanft gewölbt, laterale Senkungen schwach (123). Metanotum seicht abgerundet ausgeschnitten, im abgerundeten Winkel an der Basis der Hinterflügel eine

Verdickung, kaudolateral am 1. Abdominasegment eine schräge Senkung (Abb. 125). Bedornung am 2.-7. Segment dünn, nach hinten kleiner, dornloser Kaudalstreifen breit (Abb. 126). Dornen am 8. Segment wenig zahlreich, am 9. Segment dorsal auch eine kleine Dorngruppe. Analnaht gezweigt, Analfeld deutlich. 10. Segment mit 4 Paaren mittelgrosser Dörnchen (Abb. 127, 128).

Raupe an *Prunus*, hauptsächlich *P. spinosa*, Gangplatzmine zuletzt viereckig, durchsichtig, dann lebt die Raupe unter einem umgeschlagenen Blattrand, das Gehäuse wird gewechselt. Verpuppung im Kokon unter Blattumschlag. Standorte wie *P. finitimella*.

Gattung CALLISTO Stephens, 1834

Puppen mittelgross, uneinheitlich gebaut. Kopf in Ventralsicht vor die Wurzel der Antennae ± vorgezogen, Fortzatz stumpf oder spitz. Proboscis viel länger als die Vorderbeine (Abb. 129, 141). 2.-7. Abdominalsegment mit mittelgrossen Dörnchen, am 10. Segment 4-5 Paare von Einzeldörnchen.

Raupen der mitteleuropäischen Arten an Salicaceae und Rosaceae in Gangplatz- bzw. Faltenminen, später unter einem umgeschlagenen Blattrand, Verpuppung in einem Kokon meist ausserhalb des Raupengehäuses. Die Puppe überwintert. In Mitteleuropa 4 Arten von welchen 2 untersucht werden konnten.

Bestimmungstabelle der Arten

1 Stirnfortsatz steil, stumpf (Abb. 131) Puppe braun ..... *C. denticulella*
- Stirnfortsatz spitz, gross, schräg (Abb. 139). Puppe braunschwarz ..... *C. coffeella*

Callisto denticulella (Thunberg, 1794)

Puppe 4,4 - 5,0 x 0,9,- 1,1 mm (1 ♂, 1 ♀ aus der Slowakei), braun, Exuvie hellbraun. Nervatur an den Vorderflügeln angedeutet. Kopf in Ventralsicht in der Längsachse kegelförmig vorgezogen mit bogigen Leisten und abgerundeter Spitze ohne Frontalborste. In Lateralsicht Spitze abgerundet, Kopf dahinten nicht gewölbt, Lateralsenkungen deutlich, klein, seicht. In Dorsalsicht Stirn stark vorgezogen, Spitze abgerundet, Pronotum in der Mitte etwa 2x schmäler als lateral (Abb. 130-132). Dörnchen am Abdomen bei 25x Vergr. sichtbar, dornloser Kaudalstreifen schmal (Abb. 134). Mittelbeine grenzen aneinander und an die Proboscis etwa gleichlang (Abb. 129). 9. Abdominalsegment dorsal meist mit einer Dörnchengruppe, Genitalfeld des ♂ gross, Analnaht gezweigt, Dörnchen am 10. Segment mittelgross (Abb. 135-137).

Raupe an *Malus*, später unter einem nach unten umgeschlagenen Blattrand. Bivoltin. Waldränder, Lehnen, Gärten.

Callisto coffeella (Zetterstedt, 1839)

Puppe 4,3 - 6,0 x 1,0 - 1,3 mm (1 ♂, 3 ♀ aus der Slowakei), braunschwarz, Exuvie heller. Kopf und Thorax glänzend, Endteil des Meso- and Metanotus, 9. und 10. Abdominalsegment matter, deutlich skulpturiert. In Ventralsicht Kopf vor die Wurzel der Antennae stark, breit gewölbt, Frontalborste deutlich (Abb. 138). In Lateralsicht der Fortsatz gross, spitz, schräg frontoventral gerichtet, Lateralsenkungen deutlich. Frons im

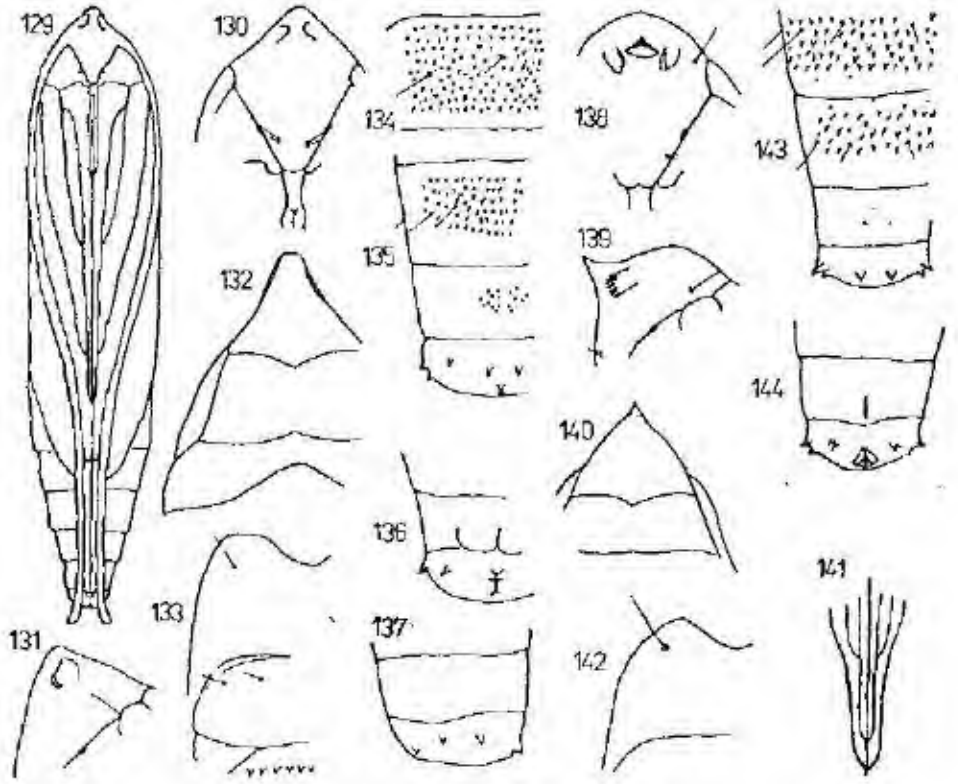

Abb. 129 - 137 *Callisto denticulella*, 138-141 *C. coffeella*. 129 Habitusbild in Ventralsicht, 130, 138 Kopf in Ventral-, 131, 139 in Lateral-, 132, 140 Kopf bzw. Pronotum in Dorsalsicht, 133, 142 Metanotum bzw. 1. Abdominalsegment, 134 4. Abdominalsegmetn in Dorsalsicht, 135, 143 Abdominalende in Dorsal-, 136, 144 in Ventral, 137 in Lateralsicht, 141 Endteil der Proboscis, Vorder- und Mittelbeine.

Umriss hinter der Spitze erst konkav, dann deutlich konvex (Abb. 139). In Dorsalsicht Frons spitz dreieckig. Vertex rel. kurz, Pronotum in der Mitte nur mässig verschmälert (Abb. 140). Am Metanotum die frontolateralen Ausläufer spitzer (Abb. 142) als bei *C. denticulella* (Abb. 133). Mittelbeine grenzen aneinander viel kürzer als an die Proboscis

(Abb. 141). Bedornung der Abdominalsegmente ähnlich wie bei *C. denticulella*, 9. Segment oft ohne Dörnchen. 10. Segment mit deutlichem Analfeld und 4-5 Paaren mitelgrosser Dörnchen (Abb. 143, 144).

Raupe an *Salix*, schliesslich unter einem nach unten gebogenen Blattrand, monovoltin. Im Gebirge, insbes. um Gewässer.

Gattung ACROCERCOPS Wallengren, 1881

Puppe mittelgross, schlank, Antennae überragen den Körper weit. Kopf abgerundet mit starkem, schräg gerichtetem Fortsatz, Frontal- und Clypealborsten nicht sichtbar (Abb. 145), Borsten überhaupt klein. Proboscis kaum länger als die Vorderbeine (Abb 165). Pronotum im Mittelteil sehr stark verkurzt (verschmälert) (Abb. 147) Rückendornen am Abdomen winzig (Abb. 150).

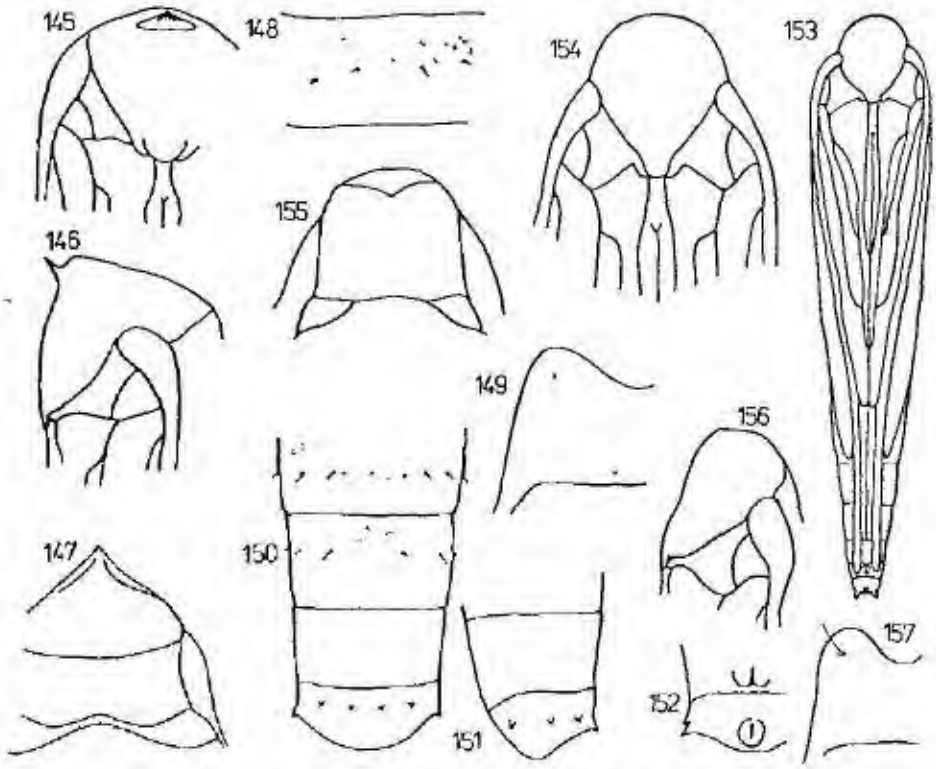

Abb 145 - 152 *Acrocercops brongniardella*, 153-157 *Spulerina simploniella* 145, 154 Kopf in Ventral-, 146, 156 in Lateral-, 147, 155 Kopf und Pronotum in Dorsalsicht, 148 4 Abdominalsegment in Dorsalsicht, 149, 157 Metanotum, 150 Abdominalende in Dorsal , 151 in Lateral-, 152 in Ventralsicht, 153 Habitusbild in Ventralsicht

Raupen in grossen, ausgesponnenen Platzminen (Blasenminen), Verpuppung ausserhalb derselben in einem Kokon. Überwinterung als Imago bzw. Puppe. In Mitteleuropa 3, nach einer anderen Auffassung (K u z n e t z o v , 1979) nur eine Art, die auch untersucht wurde.

Acrocercops brongniardella (Fabricius, 1798)

Puppe 4 - 5 x 0,6 - 0,9 mm (5 ♂, 5 ♀ aus der Slowakei), trüb hellbraun, Exuvie bleich bräunlich, Dörnchen am 2.-8. Abdominalsegment dorsal so winzig, dass sie bei 100 x Vergr. kaum noch zu unterscheiden sind (Abb. 148). Körperborsten klein. Kopf in Ventralsicht nur mässig gewölbt, in Lateralsicht der Fortsatz spitz schräg gerichtet, im Umriss dahinten ein Höcker, laterale Senkungen fehlen (Abb. 145, 146). In Dorsalsicht ist Frons vorne spitz dreieckig, hinten mässig gebogen, nicht winkelig. Pronotum im Mittelteil 4-5 x kürzer als lateral (Abb. 147). Metanotum breit abgerundet ausgeschnitten, frontolaterale Ausläufer ziemlich spitz abgerundet (Abb. 149). Analnaht ungezweigt, Analfeld angedeutet, 10. Segment mit 4 Paaren von Dörnchen (Abb. 150-152).

Raupe an *Quercus*, mit Vorliebe an Gebüsch, bivoltin, Imago überwintert. Waldsteppe, sonnige Waldränder, Verjüngungen.

Gattung SPULERINA Vári, 1961

Puppe rel. grösser, Kopf abgerundet, ohne Frontalfortsatz. Frontal- und Clypealborsten nicht sichtbar (Abb. 154-156), andere Borsten ziemlich gross. Pronotum in der Mitte unterbrochen (Abb. 155). Vorderschenkel kürzer als das Labium mit Palpi. Rückendörnchen am Abdomen winzig. 10. Abdominalsegment mit 2 Ausläufern (Abb. 153).

Raupen minieren in junger Rinde der Fagaceae und Betulaceae, überwintern, verpuppen sich in einem Kokon unter der Rinde am Ende der Mine. In Mitteleuropa nur 1 Art.

Spulerina simploniella (Fischer v. Röslerstamm, 1844)

Puppe 6 x 1 mm (1 ♂ aus Norditalien) trüb gelbbraun, Exuvie bleich. Dörnchen am 2.-7. Abdominalsegment dorsal ganz winzig. Kopf vor die Basen der Antennae breit abgerundet vorgezogen, Clypeus in Lateralsicht gewölbt, Labium an der Basis viel schmäler als Palpi labiales (Abb. 154, 156). Frons in Dorsalsicht kurz, Vertex sehr lang, Pronotum in der Mitte breit unterbrochen (Abb. 155). Metanotum mitteltief abgerundet ausgeschnitten (Abb. 157). Analnaht rel. lang, Analfeld undeutlich (Abb. 153).

Raupe miniert in breiten blasigen Gangminen an *Quercus*, *Castanea* (zuweilen schädlich) seltener *Betula*, zwischen der Korkschicht und dem grünen Parenchym, ernährt sich im wesentlichen vom Pflanzensaft (S c h ö n h e r r , 1966). Randzone junger Eichenbestände, Verjüngungen.

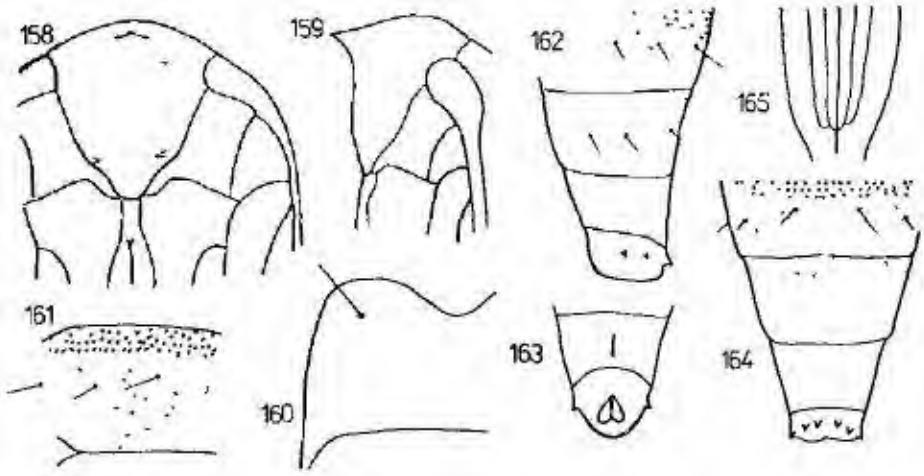

Abb. 158 - 164 *Leucospilapteryx omissella*, 165 *Parornix devoniella*. 158 Kopf in Ventral-, 159 in Lateralsicht, 160 Metanotum 161 4 Abdominalsegment in Dorsalsicht, 162 Abdominalende in Lateral-, 163 in Ventral-, 164 in Dorsalsicht, 165 Endteil der Proboscis und Vorderbeine

Gattung LEUCOSPILAPTERYX Spuler, 1910

Frons vor die Wurzel der Antennae wenig vorgezogen, abgerundet, Kopf ohne Leisten und Senkungen, Frontalfortsatz gross, spitz, ventralwärts gerichtet, Frontalborsten nicht sichtbar (Abb. 158, 159). 2.-8. Abdominalsegment dorsal nur mit einem Basalstreifen etwas grösserer Dörnchen (Abb. 161). Abdomen zum Ende stärker verjüngt, 10. Segment mit 3 Paaren von Dörnchen.

Raupen in unterseitigen Faltenminen an *Artemisia*, Verpuppung ausserhalb der Mine, die Puppe überwintert. In Mitteleuropa nur eine Art.

Leucospilapteryx omissella (Stainton, 1848)

Puppe 4,8 x 0,8 mm (1 ♂ aus Dänemark), hellbraun, Exuvie bleich bräunlich. Skulptur fein. Am 1.-8. Abdominalsegment ein Basalstreifen der mittelkleinen (bei 30 x

Vergrösserung kaum sichtbaren) Dörnchen, erreicht nicht das Niveau der Dorsalborsten, sonst die Bedornung winzig (Abb. 161). Borsten am Thorax und Abdomen ziemlich stark, am Clypeus klein. Labium scharf differenziert. Frons in Lateralsicht kaudal von dem grossen Fortsatz kaum, später schwach gewölbt (Abb. 159). Metanotum mit einem rel. schmalen abgerundeten Ausschnitt, frontolaterale Ausläufer sehr breit (Abb. 160). Abdominalende in Dorsalsicht etwas konkav (Abb. 164). Analfeld deutlich, herzförmig (Abb. 163). Die 3 Paaren von Dörnchen am 10. Segment mittelgross, spitz (Abb. 162-164).

Raupe hauptsächlich an *Artemisia vulgaris* in grossen unterseitigen aufgeblähten Faltenminen, Verpuppungskokon trüb weisslich. Bivoltin. Ruderale Standorte.

DISKUSSION

Die meisten Gattungen der Unterfamilie Gracillariinae kann man auch an Hand der Puppenmerkmale gut charakterisieren. Eine Ausnahme stellt die Gattung *Calybites* vor, deren drei mitteleuropäische Arten einander ganz unähnlich sind. Während die *Art C. quadrisignella* eine Ähnlichkeit mit der Gattung *Caloptilia* aufweist, stehen die übrigen zwei den Vertretern keiner der untersuchten Gattungen der Gracillariinae besonders nahe. Auch die zwei untersuchten *Callisto*-Arten sind puppenmorphologisch untereinander wenig ähnlich. Die Gattungen *Caloptilia* und *Leucospilapteryx*, *Gracillaria* und *Aspilapteryx*, *Micrurapteryx* und *Parectopa*, *Parornix* und *Callisto* weisen untereinander hinsichtlich der Puppenmorphologie ± eine Ähnlichkeit auf. Die von K u z n e t z o v (1979) unterschiedenen Untergatungen der Gattung *Parornix* konnte ich an Hand der Puppenmerkmale nicht bestätigen. Die in der zitierten Arbeit aufgestellten Gattungen, wie *Povolnya*, *Sauterina* und *Ornixola* konnten wegen Materialmangels puppenmorphologisch nicht untersucht werden.

ZUSAMMENFASSUNG

Die Puppen der zugänglichen mitteleuropäischen Gracillariinae werden charakterisiert, beschrieben und abgebildet, Bestimmungstabellen der Arten sowie einige bionomische Angabe werden gebracht. Das derzeitige System dieser Gruppe wird vom Gesichtspunkt der Puppenmerkmale diskutiert.

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BEMERKUNG

Neuerdings (laut Sauter, *Mitt. Schweiz. Ent. Ges.*, 60, 1987: 307-314) wurde diese Art in die Gattung *Eucalybites* Kumata, 1982 eingereiht, was auch anhand des Puppenbaues berechtigt ist.

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BOOK REVIEW

Harrison F. G. & J. O. Corliss (eds.): *Microscopic Anatomy of Invertebrates. Volume 1. Protozoa.* New York, Chichester, Brisbane, Toronto, Singapore: Wiley-Liss, John Wiley and Sons Publ., 1991, 493 pp. Cloth Price Lstg 117.00/ US Dollars 176.00.

This book is the first representative of a series of encyclopaedic monographs published in 15 volumes. This imposing treatise will cover all groups of invertebrates and serve as essential resource for students and investigators for decades to come. To facilitate timely publication while maintaining the phylogenetic order of the treatise, future volumes may be published out of sequence. The treatise begins with the protozoan protists. First volume consists of 5 chapters compiled by 7 international experts. Each chapter is concluded with an extensive list of references to the primary literature. Chapter 1 is intended to give an introduction to the Protozoa and discusses following themes: general characterization, ecological considerations, reproduction and life cycles, evolutionary considerations, role in the biotic world, and protozoan classification schemes. Following chapters cover four protozoan taxa ("sections"). The body of the text is devoted to characterization and description of cellular anatomy and functional morphology, particularly at the ultrastructural level, of free-living and parasitic protozoans, for example: size, shape, pellicle and surface features and coverings, the locomotory apparatus, connective, supportive and contractile elements, skeleton and cytoskeleton, the nucleus, endoplasmic reticulum, Golgi complex, mitochondria, microbody-like structures and mechanisms, storage elements, secretory components, inclusions, respiratory structures, reproductive elements and sexual processes, cysts and spores, etc. Chapter 2 deals with the Mastigophora. The flagellate protists present some of the smallest manifestations of the eukaryotic cell. Many flagellates have complex life cycles, in which the flagellate form can be only transient. Chapter 3 is dedicated to the Sarcodina. Their taxonomics and systematics have always been debated and presently they are again in a state of flux. Sarcodines include the amoeboid protists, some species possess flagella. Chapter 4 is devoted to the structure of "Sporozoa", a heterogeneous group of about 7.000 species of parasitic protists. The classification of these organisms is not well established, there being a number of diverse schemes proposed. Discussed here are six assemblages (phylla): Apicomplexa, Microsporidia, Paramyxea, Myxosporidia, and Actinomyxidia. Chapter 5 focuses on Ciliophora, a large relatively homogenous assemblage of protists, with some 8.000 known species. They are characterized by their possession of two kinds of nuclei, by a complex system of kinetosomes and an amount of external ciliature, and by conjugation.

The volume concludes with taxonomic and subjective indexes. Augmented extensively by 431 high-quality, mostly electron microscopic illustrations, this unique volume constitutes a most comprehensive contemporary contribution to the knowledge of protozoans.

J. Jira

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NOTE

First Conference of Czechoslovak Helminthological Section

From 6-8 April 1992, the first meeting of Czechoslovak helminthologists was organized by recently established Helminthological Section of the Czechoslovak Parasitological Society. A total of 48 parasito-logists dealing with helmiths took part at this conference in the South Moravian village of Dolní Věstonice. Specialists from research institutions (Institute of Parasitology, Helminthological Institute), Universities (Charles and Masaryk University), veterinary laboratories as well as physicians and medical parasitologists participated in this meeting.

During the conference, the following lectures devoted to individual branches of biological research in helminthology were given: History and current situation of helminthology in Czechoslovakia; Taxonomy of helminths; Biology and life cycles; Ecology; Physiology and biochemistry; Immunology and serodiagnostics; and, Genetics and molecular biology. In addition, lectures covering the main fields of helminthology were presented as well; Human helminthology, Veterinary helminthology; Free-living nematodes; Phytopathogenic nematodes; and, Enthomopathogenic nematodes.

Discussions during the conference were concentrated mainly on the aims of the Section and are as follows: 1) to enable regular contacts of specialists interested in helminthology from all institutions in Czechoslovakia 2) to improve cooperation between helminthologists and other researchers engaged in other branches of parasitology, medical and veterinary research; 3) to inform members of the Section about topical data from research of helminths; 4) to contact helminthologists and helminthological societies abroad about current status of helminthology in Czechoslovakia; 5) to publicize results of members of the Section.

During the discussion at the end of the Conference, perspectives of helminthological research in Czechoslovakia and possibilities of cooperation with helminthologists abroad were also discussed (contact address: Dr. Libuše Kolářová, Institute of Tropical Health, Postgraduate School of Medicine and Pharmacy, Sokolská 42, CS-120 00 Praha 2).

A guest of the conference, Professor R. Kendall, the retired director of the Central Veterinary Laboratory, Weybridge, England, answered questions about the current situation of helminthological research in the United Kingdom during the closing discussion.

The next conference of the Section will be again organized in April 1993 in South Moravia.

T. Scholz

INSTRUCTIONS TO AUTHORS

Acta Societatis Zoologicae Bohemoslovacae publishes in English, original papers on general, applied and systematic zoology, biographies and book reviews. Papers by members of the Czechoslovak Zoological Society are prefered. It is understood that manuscript submitted are not offered to any other journal for prior or simultaneous publication.

Authors of taxonomic papers must respect the articles of the International Code of Zoological Nomenclature (Third Edition, 1985) and to observe its recommendations. The manuscript, including footnotes, references and tables, must be typed with double spacing (30 lines per page) on side A4 paper (210 mm x 297 mm), in duplicate, and should be not longer than 30 pages. Pages must be numbered throughout the manuscript.

Formal arrangements

Heading: Title of the paper, full name of author, place of work with full a address - each on separate line.

Abstract in English, summarizing concisely the contents of the paper and indicating the relevance of the work, should not exceed 20 type-written lines.

References: within the text Dryden (1968), (Lattin, 1967), Kumari & Nair (1967), Tamiro et al (1970), the full citation should be given in the list of references; under References authors should be cited in the alphabetical order with the papers of individual authors arranged chronologically. The titles of papers should be cited in full, followed by abbreviations of periodicals in accordance with The World List of Scientific Periodicals, 4th edition, Butterworths, London (1964-1965). The number is to be given (in parentheses) only when individual numbers are paginated independently (see example b.). References to papers published in languages other than the major ones, or printed in characters other than Latin, should include English translation (in parentheses), with an appropriate note at the end (see example e.). Cyrillic alphabet should be transferred in Latin after ISO Recommendation R.9, International system for the transliteration of Cyrillic characters, 1st edition, October 1955 or by Zekalle R. 1964: *Pedobiologia*, 4: 88 - 91. Examples: (a) Dryden G. L. 1968: Growth and development of Suncus murinus on Guan. *J. Mammal.*, 49: 51 - 62. (b) Lönnberg E. & C. Gustafson 1937: Contribution to the Life-history of the striped Wrasse. *Ark. Zool.*, 29 (7): 1 - 16. (c) Lattin G. de 1967: Grundriss der Zoogeographie. Jena: Fisher, 602 pp. (d) Makkin D. 1987: The status of bats in Israel, pp: 403 - 408. In: Hanák V., Horáček I. & J. Gaisler (eds.): European bat research. Praha: Charles Univ. Press, 718 pp. (e) Tesař Z., 1972: (Complementary notes to "Fauna ČSSR - Lamellicornia I and II"). *Acta Mus. Sil.*, ser. A, 21: 73 - 87, (in Czech, Germ. abstr.)

Illustrations and their caption or legends must form a separate unit. Clear technically perfect line drawing and photographs (black-white, glossy) are accepted. The original drawing and photographs (one set) should not be more than twice as large as when printed and preferably into blocks or plates so that the blocks of drawing or photographs may be uniformly reproduced over the page width of the journal. Legends to the illustrations should be supplied on a separate sheet of paper. References to illustrations and tables in the text: Fig. 1; Figs 1 - 2; Plate I, Fig. 1 (for photografis plates); Table 1.

Tables including headings and explanations should be on separate sheets of paper, numbered consecutively with Arabic numerals.

Marking in the manuscript (in light pencil, not in ink or type written). In the text: Latin names of taxa up to generic level - with wavy underlining (italics); the names of authors cited and authors of taxa and any word to be printed spaced - with dashed-line underlining. In the References: names of authors with dashed-line, names of periodicals (not the Latin names of taxa) with wavy underlining.

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Plate I. The interior of the study plot in the mixed virgin forest relict "Medvědice" (Šumava Mts., summer aspect). (Photo by the author).

Plate II. The interior of the study plot in the mixed virgin forest relict "Medvědice" (Šumava Mts., summer aspect) (Photo by the author).

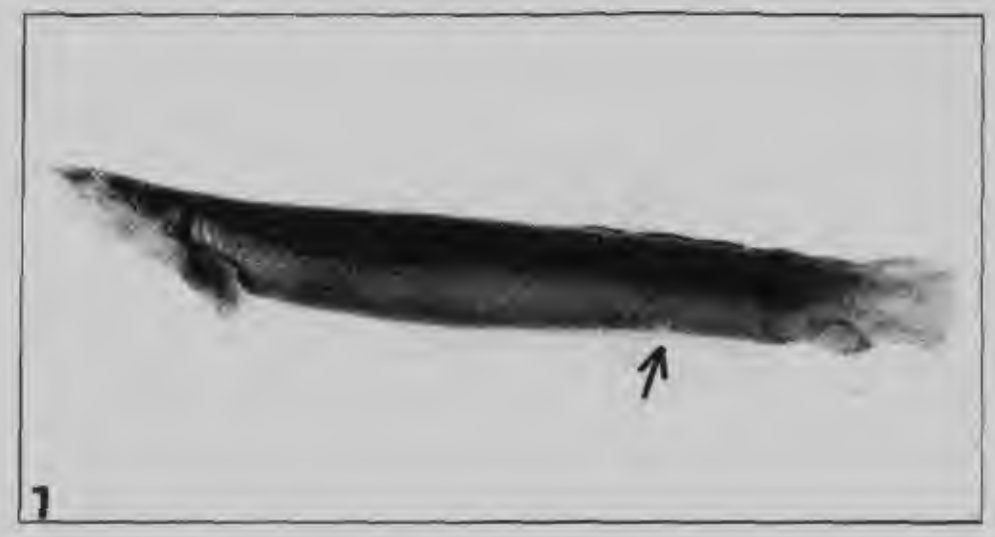

Fig. 1. The specimens of *Polypterus senegalus* from the Gebel Aulia reservoir (BL 252 mm, W 117 g). The arrow head shows the place where ventral fins are lacking

Fig. 2. The detail of the head at the same specimen showed in Fig 1.

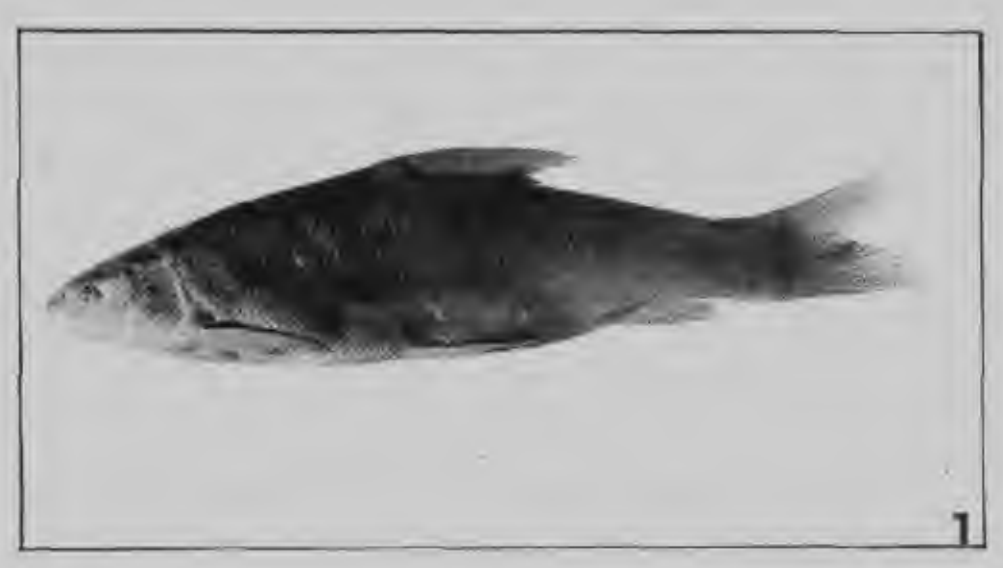

Photo 1. The specimen of *Varicorhinus trutta* from the riverine lake Dokan (total length 268 mm, body length 220 mm, weight 145 g)

Photo 2. The specimen of *Varicorhinus trutta* from the riverine lake Dokan (total length 304 mm, body length 255 mm, weight 210 g)